Assessing Early Language Development in Tasmanian Children Using the Australian English Developmental Vocabulary Inventory (OZI)

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Statement

I declare that this thesis is my own work and that, to the best of my knowledge and belief, it does not contain material from published sources without proper acknowledgement, nor does it contain material which has been accepted for the award of any other higher degree or graduate diploma in any university.

Signature : 

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Contents

Literature Review

A Review of Language Development in Children and its Assessment

Abstract

The ability to communicate is one of the most important skills a person can acquire, and therefore much research is devoted to language development. As language learning occurs in predictable stages, assessment tools aimed at examining these stages can be used to chart normal development. Research indicates that due to the nature of children's early attention skills, the results of some language assessment methods such as laboratory sessions can be compromised by external factors. These problems have sometimes been addressed by utilising parental reports, which have been proven to be valid and reliable sources of information. The MacArthur-Bates Communicative Developmental Inventory (CDI; Fenson et al., 1993) is a commonly used parental report that has been translated into a number of different languages as well as adapted for use with a number of other English-speaking populations. Because the language spoken in different populations vary according to cultural and historical influences, research into any future English adaptations is necessary in order to ensure that these adaptations are representative of the language and mirror the original CDI before they are published. Past research has utilised a number of assessment methods to validate wordlists. These include structured, standardised tests, as well as language samples obtained from laboratory sessions or diaries kept over a specific time. Examination of the interaction of variables such as maternal interaction, gender and birth-order with language development have also been used to examine whether a proposed adaptation displays similar results to those of studies using the CDI or other previously researched adaptations of it.

1. Introduction and Overview

Whenever a new assessment tool is being developed for use in a particular field, much research is undertaken during its trial period. This research is necessary so that the reliability and validity of the tool can be established, as well as norms and other standards that can be used as guidelines. After this stage the instrument is ready to be published and introduced for use into the designated population. When adaptations of assessment tools that are already published are being considered, this same process applies. This testing is necessary as it is important to know that the new adapted instrument adequately represents its parent tool.

Adaptations of existing assessment tools are made to accommodate other languages, (e.g., Conners' Parent Rating Scales Spanish - CPRS-R:L; Conners, 1997), nationalities, (e.g., Wechsler Intelligence Scale for Children 4th Edition, Australian - WISC-IV Australian; Wechsler, 2005), age groups, (e.g., Hare Psychopathy Checklist: Youth Version - HARE PCL:YV; Forth, Kosson & Hare, 2003), or to better reflects current norm characteristics, (e.g., Wechsler Adult Intelligence Scale 3rd edition - WAIS-III; Wechsler, 1997).

While an assessment tool is being developed it is necessary to identify the components of the variable being tested. Many life processes can be seen to occur as a sequence of stages. As the stages are explored it can then be determined whether to look at the life process as a whole, or whether the stages can be easily identified as such. It is also necessary to think of the usefulness and practicality of the information being provided when determining what is to be measured. Language acquisition is an example of a process that occurs in identifiable stages. Therefore an assessment tool that is able to identify specific

features or linguistic events as they happen would be useful in predicting normal developmental patterns. This review will look at identifying appropriate assessment tools when the course of language development is being examined.

Certain developmental and/or environmental issues need to be considered when developing assessment tools for use with young children. This is important as these factors could influence the outcome of results and therefore affect the reliability and validity of the data collected. As these factors are identified, alternative ways of collecting the data can be proposed, or methods that address the issues in a way that minimise their effects on the results can be implemented (e.g. Rescorla, 1989). This review will also address language assessment methods in order to determine the most appropriate ones for use with young children.

The efficiency of some test instruments leads to their popularity as an instrument of choice within the designated population. This is the case for the McArthur-Bates Communicative Development Inventory (CDI; Fenson et al., 1993). This is a parental report checklist that assesses the vocabulary competence of children between the ages of 8 and 33 months. It has been used in numerous studies and been proven to be valid and reliable (e.g., Feldman, Dollaghan, Campbell, Kurs-Lasky, Janosky, & Paradise, 2000). The scope of the CDI as an assessment tool has grown beyond the original target population of normally developing children to include specialised populations (e.g. Thal et al., 1999). Its popularity has also led to its use with populations with native languages other than English. In these cases it then becomes translated into another language and tests are again carried out to determine the reliability and validity within the new population as well as how closely the new instrument matches the original (e.g.

D'Odorico, Carubbi, Salerni, & Calvo, 2001). Greater detail concerning the development, use and scope of the CDI will be provided in this review.

A number of variables have been identified that can impact on language development in young children. These include maternal education (Hoff-Ginsberg, 1992), maternal interaction (Rowe, Pan, & Ayoub, 2005), the presence or absence of siblings (Pine, 1995), gender (Hartshorne & Ullman, 2006), and socioeconomic status (Pan, Rowe, Singer, & Snow, 2005). These variables will be briefly discussed with greatest detail being paid to gender and birth order. The review will conclude with implications for further research.

2. Language Learning

The ability to communicate is essential for all species. As with other skills a child learns, language acquisition is seen as a developmental process. Language is an interactive tool used to communicate both distress and pleasure to others. Babies start off with the basic communication methods of sounds and gestures (Craig & Baucum, 1999). They cry to indicate discomfort, and coo or babble to show appreciation or pleasure. Their early repertoire also includes gestures such as head nodding, hand signals, and facial expressions. Finally the babbles begin to take the form of the language of others around starting with short monosyllabic words such as 'da' (dad) or 'ta' (thanks) (Craig & Baucum, 1999). Eventually more identifiable words emerge and even become 2-word combinations. This is the usual course of language development (Craig & Baucum, 1999) and age seems to be a good approximate of each linguistic milestone (Pan et al., 2005).

As children begin to use language to express ideas, the rate of word acquisition is relatively slow, with children learning only a few new words per

month (Goldfield & Reznick, 1990). Following this slow start, children usually show a vocabulary spurt between the ages of 14 and 22 months resulting in an increase rate of word learning (Goldfield & Reznick, 1990; Lucariello, 1987). This is estimated to occur close to the 50-word milestone (Pine, 1995). A number of other linguistic milestones follow this vocabulary spurt such as the first 2-word combinations (Bates, Bretherton, & Snyder, 1988; Bornstein & Haynes, 1998; Fenson et al., 1994), as well as an increase in the ability to refer to things that are not physically present (Goldin-Meadow et al., 1976).

Language is made up of two main components: the words and the rules for combining them which are known collectively as 'grammar' (Gleitman, 1995). At the point of 2-word combinations and beyond children begin to learn the rules of the language they are exposed to (Gleitman, 1995). For example, they start to use plural or past tense forms of words in appropriate places. Since language development happens along a routine course, assessments designed to examine these components would be helpful in order to monitor and predict the course of normal language development in the early stages of a child's life.

3. Language Assessment

Standardised clinical or laboratory assessments usually involve the measurement of a variable in a controlled setting. In the case of language assessment, this may include object naming, language generated in a specific context (e.g., having a story read to the child), or recording language used during a timed play session. Specific training and instructions are required for measuring these tasks so that the methods used are consistent, thus increasing the validity and reliability (Marchman & Martinez-Sussmann, 2002). Although these

methods of testing are usually practical in a variety of settings, the very nature of young children can provide obstacles that can affect the results of such measures (Rescorla, 1989). The length of such tests may be an obstacle due to the short attention span of young children and therefore shorter time periods may be required. Consequently these shortened time periods may be insufficient to accurately assess the full vocabulary ability of the child (Feldman et al., 2005; Reese & Read, 2000). Being examined in a strange environment by unfamiliar people can be a daunting experience for young children (Feldman et al., 2005). Being overcome by shyness, fear or simply being overwhelmed by the situation can therefore affect the level of co-operation received from the child, resulting in a less than ideal representation of his/her vocabulary competence. Thus the reliability and validity of these types of assessments can be compromised due to the external factors mentioned above.

An alternative method of language testing is to have parents record the child's language in the form of word checklists or diaries. These are known as parental reports. The use of parental reports is becoming increasingly popular especially for assessments involving very young children, being used in both clinical and research settings (Fenson et al., 1993; Rescorla, 1989). These reports can provide reliable information on the communicative-linguistic development of young children. This is because parental reports have the potential for providing a more comprehensive and representative appraisal of a child's language skills, including spontaneous interactions, that would not occur in a laboratory, clinic or school setting (Fenson et al., 1994; Klee et al., 1998).

As with any assessment method there are always pros and cons. A number of disadvantages are present when using parental reports. In general

parents usually lack the appropriate training that would allow them to differentiate various linguistic features in their children's language (Dale et al., 1989). Parents can be unsystematic when reporting different components of language competence. Fenson et al. (2000) conducted research that supported the abovementioned findings on language competence. They found that the accuracy of parental reports regarding language comprehension skills at several ages was poorer than the accuracy regarding language production skills. This is because more skills and training are required to assess language comprehension than language production. Parents may also display bias by overestimating or underestimating the child's ability, as assessing language development involves both subjective and objective components. In being retrospective, parents may not be able to accurately recall the child's true ability (Dale et al., 1989).

However the advantages of parental reports far outweigh the disadvantages. Parental reports are more cost effective than behavioural assessments and are easy to administer (Feldman et al., 2000; Thal, Jackson-Maldonado, & Acosta, 2000). They can also be used to monitor specific linguistic changes that result from intervention, as well as to provide a useful way of evaluating the representativeness of a laboratory sample. Parental reports are also less sensitive to context or task effects than behaviour measures (Bates et al., 1988).

When language sampling occurs in a predefined location such as a laboratory, clinic or participant's home specified tasks are assigned such as playing with toys or reading a book, and the language generated is recorded. Only language associated with these behaviours or contexts would be generated and this language sample alone can not be generalised as the child's full

vocabulary ability (Marchman & Martinez-Sussmann, 2002). On the contrary, parents have extensive experience with their children over a wide range of naturalistic situations. This information can be based on extensive sampling from observations in a number of environments and a range of situations and/or contexts. As a result the language skills can be evaluated based on multiple observations over time. They can also provide general evaluation of the child's early developing skills (Bates, Dale, & Thal, 1995; Bornstein & Haynes, 1998). Because parental reports do not require the participation of the child, they can be useful when evaluating children who are reluctant to work with strangers (Feldman et al., 2000).

Dockrell (2001) suggested that the validity and reliability of parental reports are dependent on three factors: (i) that the information needed is current and not retrospective, (ii) that the skills are emergent, and (iii) that the skills are identified by recognition as opposed to recall. The CDI, a parental report of early vocabulary competence, has been validated against other parent report measures, concurrent language samples, and other structured tests (Clark, Jorgensen, & Blondeau, 1995; Dale, 1991; 1996; Dale et al., 1989; Fenson et al., 1994; Rescorla & Alley, 2001) .These include a number of studies which compared the results of the parental reports to those obtained from other structured tests such as the vocabulary items on the Bayley Scales of Infant Development (Bayley, 1969), Expressive One-Word Picture Vocabulary Test (Gardner, 1981), and the Index of Productive Syntax (Scarborough, 1990). For example, Fenson et al. (1994) found that the scores obtained from the CDI were equivalent to scores obtained from laboratory measures of language taken concurrently. In another study involving a structured test Bates et al. (1988) reported that parental reports

of language comprehension at ages 10 months strongly predicted Peabody Picture Vocabulary Test scores at 28 months. Conversely, laboratory language samples at 10 months had no long-range predictive value.

Feldman et al. (2000) obtained CDI scores from a sample of children at ages 12 and 24 months respectively. They found that the mean number of words in vocabulary production for children not combining words was substantially below that for children who were combining words. This suggested that there was internal consistency between parental reports of vocabulary syntax and for general vocabulary. In another study which examined the ability of caregivers/parents to provide valid estimates of vocabulary and grammar in young children learning both Spanish and English, Marchman and Martinez-Sussmann (2002) found that the relationships between reported and behavioural measures were consistently strong for both structured (object naming in a laboratory setting) and spontaneous (language generated in free play sessions) measures of word production.

As previously mentioned, the use of diaries is another method of parental reporting used for measuring children's early language development (Dale et al., 1989; Lieven, Behrens, Spears, & Tomasello 2003; Robinson & Mervis, 1999; Snyder et al., 1981; Spurt, Goldfield, & Reznick, 1990). In diary studies parents are asked to record a sample of their child's language over a specified timeframe. Diaries are used when systematic data is required over a period of time. They can be used for a variety of purposes, including to examine the linguistic differences between children's use of two languages (Kim, McGregor, & Thompson, 2000), to provide information about language learning in specific populations (Donahue,

1993; Spurt et al., 1990), or information about specific components of vocabulary acquisition (Snyder et al., 1981).

Some disadvantages may also be associated with diary use. Recording a language sample can be a time-consuming task. Also, as vocabulary size increases, it may be difficult for parents to be able to accurately record every word spoken during the specified period. However, diary use can also be advantageous in a number of ways. Because diaries sample language as it is produced over a specified period, the information they provide is comprehensive. They are therefore a better tool for estimating actual vocabulary than checklists which usually consists of a list of words commonly used by a child during that particular period. They can therefore be used to validate information provided by a CDI (Robinson & Mervis, 1999).

Like studies involving wordlists, those that require language to be recorded in diaries provide evidence that parental reports can be reliable. For example, the studies of Dale et al. (1989) and Snyder et al. (1981) both showed that the use of maternal diary recording represented valid and reliable sources of information when compared to other standardised tests. Other studies also show that parents are reasonably good informants about their child's expressive language development between the ages of 18 – 30 months when validity is established by diary studies done in the same period (Robinson & Mervis, 1999). A study conducted by Rescorla (1989) suggested that reliability of data collected from diary studies does not appear to be dependent on external factors such as maternal educational level. This study involved a sample of inner-city mothers who were mostly employed and had no more than high school education. Valid

information was obtained on vocabulary measures as well as the presence of word combinations for children ages 22 to 26 months.

Kim et al. (2000) proposed that when used in combination with wordlists, diaries can serve to maximise the reliability of the data collected, and this has been confirmed in other studies involving the use of both forms of parental reporting. In their study using both the CDI and diaries, Robinson and Mervis (1999) found that the CDI underestimated the number of words produced in the diary, with the rate of underestimation increasing as the number of words increased. They therefore proposed that diaries could be used to validate information provided by the CDI for the same period.

In summary, although standardised tests are reliable and valid methods of assessment, when dealing with specific populations such as very young children other established methods such as parental reporting have proven to be more suited to maximising the reliability of the results obtained.

4. MacArthur-Bates Communicative Development Inventory (CDI)

As previously mentioned, the MacArthur-Bates Communicative Development Inventory (CDI; Fenson et al., 1993), is a word checklist which uses parental reporting to assess a child's early communicative and lexical development. It consists of two separate forms – the CDI: Words and Gestures (CDI-WG) and CDI: Words and Sentences (CDI-WS). The Words and Gestures form, also known as the 'Infant Form', is designed to assess the language development of children between the ages of 8 and 16 months. It assesses vocabulary production and comprehension, communicative gestures (e.g., pointing, nodding waving), symbolic behaviour (e.g., using a stick as a spoon),

and non-verbal imitation (e.g., pretending to open the door with a key). The Words and Sentences form is designed for use with children 16 to 30 months old and is also known as the 'Toddler Form'. This assesses vocabulary production, knowledge of irregular word forms including nouns (e.g., *men*) and verbs (e.g., *ate*), overgeneralisation of word endings to irregular nouns (e.g., *teeths*) and verbs (e.g., *goed*), and syntactic complexity (e.g., *these my teeth*).

The CDI is a sample of language used by children in general and not the vocabulary repertoire of a particular child, as this would involve words familiar to a particular environment and would differ from one child to another. The CDI has been found to provide a valid representation of emerging language skills (Bates et al., 1995; Bornstein & Haynes, 1998). Feldman et al. (2000) studied five areas of CDI measurement – vocabulary production, irregular word forms, over-regularised words, length of the longest utterances, and sentence complexity. These authors found that the major skills measured by the CDI indicated generally increasing monotonic growth in the age period from 10 to 13 months and 22 to 25 months (the age range at which each CDI was collected). Since the results from this study produced trends that were similar to other studies involving the CDI, the authors concluded that scores on the vocabulary production scale of the CDI: Words and Sentences represented reasonable estimates of a child's expressive vocabulary size.

The CDI has become a popular choice for investigations in a number of populations which differ from the original sample of normally developing children. It has been used with children who are at risk for language delay (Horwitz et al., 2003), with developmental disorders (Caselli et al., 1998) such as Down Syndrome (Miller, Sedey, & Miolo, 1995), and with specific clinical

disorders such as cleft palate (Scherer & D'Antonio, 1995), and focal brain injury (Thal et al., 1991).

The CDI has also been found to be useful in addressing practical issues such as the effects of infant day care on cognitive and language development (NICHD Early Child Care Research Network, 2000). Because this wordlist has proven to be effective in various populations it has been used to research a number of theoretical issues such as the contributions of genetic versus environmental factors relating to rates of language development (Dionne, Dale, Boivin, & Plomin, 2003). Use of the CDI has even been expanded to include studies with major clinical and public health implications (Daniels, Longnecker, Rowland, & Golding, 2004).

Due to its popularity as an effective assessment tool in childhood language development, the CDI has been translated into a number of different languages including Spanish (Thal et al., 2000), Italian (Caselli, Bates, Casadio, Fenson, Sandler, & Weir, 1995), Japanese (Ogura, Yamashita, Murase, & Dale, 1993), Hebrew (Maital, Dromi, Sagi, & Bornstein, 1998), and Swedish (Eriksson, Westerlund, & Berglund, 2002). In producing these versions the checklist was first translated word for word, but the cultural and linguistic aspects of the new language were also taken into account and incorporated into the tool, so that they accurately represented the parent tool in its full scope (e.g., Marchman & Martinez-Sussmann, 2002).

Factors such as migration, trade, music, television, radio and the internet have made it possible for individuals to experience different languages in a spoken or written form. These factors may also influence some dialects and varieties of a particular language until they become distinct enough to become

accepted as a separate language. An example of this is the English language. The popularity of English as a first or second language has risen worldwide, and the English spoken in different parts of the world is influenced by the historical, cultural and linguistic features common to that particular region (Kachru, Kachru, & Nelson, 2006). For example, the English of Australia and New Zealand has been influenced by hundreds of indigenous languages which predate the British and Irish settlements (Burridge & Mulder, 1998). West Indian English is influenced by the West African languages of the slave ancestors (Roberts, 1998), and Canadian English has both American and British influences (Kachru et al., 2006). This difference has been recognised and acknowledged from as early as the 19th century when dictionaries of different English varieties began to be published; for example, 'The Dictionary of Americanisms: A Glossary of Words and Phrases' by Russell (1860).

Caution should therefore be taken when interpreting results from an assessment tool designed for use in a country other than the one it was designed and validated in, as there may be factors present that can influence the outcome of the results. This is especially true when language production is the variable being examined, as children may not be exposed to certain words due to their environment. For example 'echidna', being an animal native to Australia would probably not be a common word in the spoken language of English-speaking Americans or Canadians. This would decrease the chance of it being heard and produced by children learning English in these countries. The reverse is also true; words common to American vocabulary may not be commonly used in Australia or New Zealand. For example 'candy' to an American means the same as 'lollies' to an Australian. The child from one country may know the concept in

his/her native variety of English but the word found on the parental checklist designed for another English-speaking population would not necessarily be spoken by that child and would therefore not be included in a count of all the words spoken by him/her at a particular age. This would then result in a misrepresentation of that child's actual vocabulary competence.

The CDI was originally designed for an American English-speaking population. Using it in other English-speaking territories without taking into account the historical, cultural, and linguistic influences of these varieties of English would be the equivalent of only doing a word-for-word translation into a foreign language such as Hebrew or Spanish, while ignoring the cultural and grammatical differences of the languages. The instrument would be not be a parallel measure of the original tool (CDI) as reliability and validity may be compromised as a result of the translation process. In an effort to maximise the effectiveness of the CDI within an English-speaking population with a different linguistic makeup, researchers from a number of English-speaking countries have developed adaptations that are more appropriate as a measure of vocabulary competence within their own populations. These include a British version (Klee & Harrison, 2001) and a New Zealand version (Reese & Read, 2000). As time progresses it is expected that more English adaptations will emerge as researchers find the American version insufficiently able to truly reflect the vocabulary content of a population. One such adaptation which is currently under development is the Australian version of the CDI, known as the Australian English Adaptation of an Expressive Vocabulary Inventory (OZI). It is being developed by researchers Schwarz, Burnham, and Bowey at the University of Western Sydney.

In summary, the popularity of the CDI has given rise to its use with a variety of populations and research settings, as well as adaptations into numerous foreign languages. These adaptations include a growing number of English variations which take into account the cultural and historical differences of the respective varieties of the English.

5. Factors affecting language production

Much research has considered the influence of parental interaction on the developing language of children. Some researchers have suggested that maternal input and child characteristics work together to influence the variability in the amount, lexical diversity and pragmatic characteristics of a child's language development (e.g., Rowe et al., 2005). Past studies have highlighted a number of variables that impact on the rate of language acquisition in young children. These include the highest completed academic qualification of the mother (Hoff-Ginsberg, 1992), maternal mental health, mother-child interaction, the presence or absence (Pine, 1995) and age of siblings, as well as gender and socioeconomic status (Hart & Risley, 1995). A number of studies have dealt mainly with maternal variables in relation to child language development (e.g., Jones & Adamson, 1987; Pan et al., 2005). This may be due to an assumption that mothers have more influence over the language development of their young child than do fathers because of the amount of time a child spends in its mother's presence versus that of the father. However, this may no longer be the case as more women are pursuing studies and employment outside the home.

Although there is some consensus about the effect of the various variables on language acquisition and production, there is also some disagreement found in the literature. Some studies have suggested that the

amount of maternal input and diversity of lexical input are predictors of vocabulary growth in children from low income and middle income families (Hoff, 2003; Hoff & Naigles, 2002; Weizman & Snow, 2001). For example, the children of parents who spoke more to them produced more words than those children whose parents spoke less to them (Hart & Risley, 1995). Also children had richer vocabularies when their mothers used more diverse speech toward them (Pan et al., 2005). Others have suggested that the diversity of word types rather than the quantity of words spoken by mothers to their children is a good predictor of child vocabulary (Pan et al., 2005). Still other research has shown that parents who directed more speech to their children had children with larger vocabularies (Hart & Risley, 1995). The impact of education and socio-economic status seems to be tied to the amount of talk produced when mothers interact with their children. Some studies have shown that parents with fewer educational achievements and who were less advantaged financially talked less with their children (Hart & Risley, 1995; Hoff-Ginsberg, 1991). It would seem that mothers who talk more to their children use more diverse vocabulary than do mothers who talk less which implies that the two are somehow intertwined. However, this issue is beyond the scope of this study.

There are also a number of other factors that appear to have an effect on language development in young children. These include birth order and gender. A number of studies have suggested that generally there is a gender difference in early language development in favour of girls (e.g., Fenson et al., 1994; Hartshorne & Ullman, 2006; Lynn et al., 2005). This difference may be accounted for environmentally by social differences and expectations, or by cognitive differences between the two genders.

Although in general the difference is highlighted and the cause is ignored, there are studies that provide evidence for both a social influence and a cognitive difference between girls and boys in language development. Leaper, Anderson, and Sanders (1998) conducted a meta-analysis which examined gender effects of parents' speech on their children. Earlier studies suggested that the differences in adult styles of language use may be a result of their childhood interactions. The results of the meta-analysis by Leaper et al. (1998) showed that when the focus of measurement was on quantity (number of words spoken) of speech as opposed to duration (length of conversation) or complexity (length of utterances), mothers were more talkative with their children than were fathers. Later studies have also supported the findings of Leaper et al. (1998). For example, Rowe, Coker, and Pan (2004) also found that mothers talk more to their daughters than to their sons.

Most evidence seems to suggest that girls have a higher verbal ability (e.g., larger and/or more diverse vocabularies) than boys of the same age and this difference seems to be evident over a wide age range. Paavola, Kunnari, and Moilanen (2005) looked at the communicative and linguistic skills of their Finnish population in an observation study of maternal responsiveness and infant intentional communication during play sessions. They found that at 10 months girls demonstrate more intentional communicative actions (e.g., request objects or comment on or request actions) during play than boys. They also found that at 12 months girls produced more words than boys. In another study examining vocabulary competence in early childhood, Bornstein and Haynes (1998) compared three methods of language sampling in an English-speaking population; observing the speech of a child with their mother, experimenter

assessments, and maternal reports in a population of 184 20-month-old children. They found that girls consistently outperformed boys on individual language measures. Lynn et al. (2005) compared sex differences in 3-year-old children using the Boehm Test of Basic Concepts (Boehm, 1986). This study confirmed that girls have greater vocabulary sizes than boys at each stage up to 30 months.

A gender difference in favour of females is also reported in a number of studies using the CDI. In a study examining individual differences in language of boys and girls, Bauer, Goldfield, and Reznick (2002) reported that girls appear to develop vocabulary more quickly than boys. In their study examining the measurement properties of the CDI with children at ages 12 and 24 months respectively, Feldman et al. (2000) found that girls scored higher than boys on all but one of the sections of the CDI-WG, and on all sections of the CDI-WS. They concluded that on average girls were ahead of boys in language development by approximately 1-2 months.

Birth order, too, appears to have an effect on language development, and there are a number of reported milestones related to birth order. Pine (1995) found that birth order had strong effects on stylistic variables such as vocabulary composition with second-born children, having a higher percentage of frozen phrases (phrases that are fixed in form or word order, e.g., *'hi-5'*, *'baa baa black sheep'*) at the 100-word mark. In his study mothers were asked to keep a diary of their child's speech over a period of time, and these were collected at monthly intervals. A 60-minute audio recording was also made on a monthly basis for first-born children. A monthly telephone interview was also conducted with the mothers of the second-born siblings. The diary contained any spontaneous occurrence of a new expression together with its meaning and context. The birth-

order effects were obtained by examining the age at which the first-born and second-born children reached 50 and 100 words. The results showed that first-born children reached the 50 word mark before their second-born siblings. However, there was no significant difference at which the two groups reached the 100-word mark. He suggested that this difference between the vocabulary component of first-born and second-born children may be due to the greater use of observational learning by later-born children, as they have a greater need to process language that is not geared toward them.

Other research has supported these findings that later-born children are more advanced than first-born children in some aspects of language development including pronoun production and conversational skills (Bornstein et al., 2004). Akhtar, Jipson and Callanan (2001) suggested that later-born children are exposed to more pronouns through overheard speech than through direct speech. Much of the language children learn is language that is addressed to other members of the family. Speech to other siblings is monitored by children even before the age of 2 years (Akhtar et al., 2001). Other research confirmed the findings that speech directed to one sibling resulted in change of behaviour in other siblings (Dunn & Shatz, 1989). Dunn and Shatz found that approximately 22% of conversational turns of later-born children were in the form of intrusions (responding to conversation that was directed to someone else). This would suggest that later-born children were attending to speech that was not directly addressed to them, further suggesting that they have more opportunities to receive linguistic input than their first-born counterparts. Other studies also show that later-born children use more social regulative language (e.g., attention

getters, expressing feelings, or making requests) (Jones & Adamson, 1987) when compared to first-borns.

Jones and Adamson (1987) found a number of other reasons that could account for the differences in the vocabulary components of first-born children and their later-born counterparts, as reported in their study looking at language use between mothers and their young children in specific contexts. For example, mothers talked less to their younger children when older siblings were present. Also, when talking to later-born children, mothers tended to ask fewer questions and elicited fewer verbal responses even when observed in a similar context. These authors also found that in a mother-child-older sibling triad the use of social regulative language of later-born children increased significantly while it substantially declined when observed in a mother-child context. Similar results were also found by other researchers. For example, Hoff-Ginsberg (1998) found that in addition to asking more questions when in conversation with later-born children, mothers used shorter utterances. Another finding by Jones and Adamson (1987) was that language use differed depending on the situation. For example, more utterances were produced by the children during book reading sessions than during free play sessions. Also though the number of utterances of later-born children and their first-born counterparts did not differ significantly when observed with their mothers only (mother-first-born dyad, or mother-later-born dyad), when both first-born and later-born children were present with their mothers in free play sessions, the later-born children produced fewer utterances than when they played alone with their mothers.

Another point of variability of the effect of birth order on language development can be found in the space between the age of the first child and the

nearest sibling. Smaller age gaps were associated with greater cross-sibling consistency in maternal verbal behaviour (Dunn, Plomin, & Daniels, 1986), while larger gaps in age were associated with more intellectual and socially stimulated interaction with siblings (Teti, Bond, & Gibbs, 1986).

Despite these findings, some researchers have suggested that the finding of first-born vocabulary competence exceeding that of later-born children is simply an artefact of maternal reporting. Bornstein et al. (2004) conducted a study of vocabulary competence in first-born and second-born children of the same chronological age. They found that vocabulary competence of all word classes (noun, adjective, etc.) and the expressive communication of first-born children exceeded that of second-born children in maternal report. This study also utilised 2-hour observation sessions in the home by a trained experimenter, followed by a telephone interview of the child's expressive and receptive vocabulary at a later date. No differences between the language of the first-born children and that of the later-born children were found in either of the latter two measures, therefore a difference was only evident when mothers were reporting vocabulary competence.

Some studies have examined multiple variables together in relation to language development. Fenson et al. (1994) in their validation studies of the CDI reported that when comparing social class, gender, and birth order, that of the three, birth order proved to have the most consistent effects. Later studies which addressed these factors together also yielded similar results. Berglund, Eriksson, and Westerlund (2005) conducted studies comparing communicative skills in relation to gender, birth order, childcare, and socioeconomic status in children who were 18 months old. They found that gender effects (boys versus girls) were

greater than birth order effects (first-born children versus later-born children) on early language development when the two variables were examined together.

In summary, many believe that it is a combination of parental and child characteristics that determine the rate of children's language acquisition and competence. Most research, however, has focussed on maternal rather than paternal characteristics as it may be assumed that mothers generally spend more time with young children than do fathers. The research on maternal variables such as education, mental health, and socio-economic status tends to imply that the quality and quantity of maternal talk has an effect on language development. However other variables such as gender and birth order also seem to influence language development in young children.

6. Conclusion

Language acquisition seems to occur in a series of defined steps of which age is a good predictor. The ability to chart this course of development could provide useful information regarding the children involved. Sometimes assessments need to be adapted to suit special populations or translated in different languages. The advantage of developing adaptations of already established measures is that there is a wealth of research that provides information on how the measure interacts with different variables. This information can therefore provide a point of comparison for the interactions of these variables and the new assessment. When identical variables are measured using both the parent tool and the new adaptation, results showing similar trends would indicate that the parent tool and the new adaptation are measuring the same concepts.

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Empirical Study

Assessing the effectiveness of the Australian English Developmental Vocabulary Inventory (OZI) using a diary report

Abstract

Parental reports have been found to be valid and reliable tools for estimating language development in young children. The current study investigated the effectiveness of the Australian English Developmental Vocabulary Inventory (OZI; Schwarz, Burnham, & Bowey, 2003) at assessing language development in Australian children, in a sample of 23 children (9 boys, 14 girls), aged 17 to 24 months, from Southern Tasmania. The results from this study were compared to those from previous studies that utilised wordlists. When gender and birth order effects were examined in relation to language development the vocabulary scores obtained showed some similar trends to those found in other studies. When the total word types produced from records of a 7-day diary were compared to the vocabulary scores from the OZI, both completed between the ages of 20 – 22 months old, the two variables showed a strong correlation ($r = 0.67$). Despite the small sample size a number of suggestions are offered for alterations to the OZI based on parental reports and these are discussed in the study. The overall results suggest that the OZI may be an effective tool for assessing language development in Australian children. However, more research is needed to validate these findings.

Being able to communicate with others is essential as it helps to ensure that an individual's needs and desires are shared with others in the environment. This communication can occur through signs and gestures (e.g., head nodding, pointing, reaching for an object, laughter, cooing, crying) or the use of words. Language development in early childhood begins with a combination of signs and gestures and eventually progresses to include the use of words (Craig & Baucum, 1999). Language development is thought to be a process of maturation (Fenson et al., 1994) that occurs along a specific path with various milestone events along the way. There is wide variability in language development as different combinations of factors lead to individual differences in the rate and quantity in which it occurs (Fenson et al., 2000). However, despite this variability there are particular milestones which seem to occur within certain age ranges making age a good predictor of stages in language development (Pan, Rowe, Singer, & Snow, 2005).

Over the years research has provided a great deal of information on how language develops over the first few years of life. As children begin to use expressive language the acquisition of new words occurs at a relatively slow rate of only a few words per month (Hoff, 2005). Following this, approximately between 14 – 22 months, children usually experience a period of accelerated word acquisition (Goldfield & Reznick, 1990). During this period children usually also reach the 50-word acquisition point (Pine, 1995). Another important milestone in early language development is the use of 2-word combinations which takes the form of so-called telegraphic speech (Hoff, 2005). For example, a child might say 'daddy sock' to mean either 'this is daddy's sock' or 'daddy, this is my sock'. As young children approach the 24 – 30 month mark,

grammatical rules begin to become incorporated into their speech; for example, the use of plural and past tense forms of words (Fenson et al., 1994).

Factors such as gender and birth order have been shown to influence language development in early childhood. A number of studies have shown that girls tend to have a higher rate of vocabulary production (Berglund, Eriksson & Westerlund, 2005; Fenson et al., 1994) and comprehension (Berglund et al., 2005) than boys of the same age. This female advantage seems to occur at all stages of early language development (Fenson et al., 1994), even up to preschool age (Lynn, Raine, Venables, & Mednick, 2005) and perhaps beyond. Feldman et al. (2000) found that girls outperformed boys of the same age not only on vocabulary production but also on other vocabulary components such as number of phrases understood, and gestures.

Studies on birth order have shown that certain vocabulary features are more prevalent in the speech of first-born children, while other aspects occur more in the language of later-born children. First-born children have been shown to have larger vocabularies than their later-born counterparts (Jones & Adamson, 1987). Pine (1995) conducted a study on birth order effects on language development, and included a continuous maternal diary of the speech of 9 first-born children and their siblings. He found that first-born children reached the 50-word mark earlier than later-born children; however, this difference disappeared by the 100-word mark. A number of linguistic advantages have also been associated with later-born children. For example, they have been shown to have higher rates of pronoun production at the 50-word mark (Oshima-Takane & Derevensky, 1990; Pine, 1995) and frozen phrases (e.g. 'all gone', 'hi-5') at the 100-word mark (Pine, 1995) than their first-born counterparts. Later-born children were exposed

to more pronoun use in maternal speech that was directed to others than to themselves, thus they had an advantage of learning more personal pronouns than their first-born counterparts (Akhtar, Jipson, & Callanan, 2001). Later-born children also used more social regulative speech (e.g. 'I like it', 'hello baby') than first-born children (Jones & Adamson, 1987). These findings may also be attributed to the advantage later-born children have of hearing language spoken to and by their older siblings. Bornstein, Leach, and Haynes (2004) compiled a collection of children's utterances recorded in three ways: maternal report, experimenter assessment and a language sample. Analysing these samples for the combined effects of birth order and gender on language they found that first-born girls outperformed boys on all vocabulary competence measures, while later-born girls outperformed boys on most measures. This indicates that gender has a greater effect on language development than birth order has.

There are a number of language assessment methods which have been used to collect the vast body of data that we have available to us today. There are screening instruments, such as the Clinical Linguistic & Auditory Milestones Scales (CLAMS; Capute et al., 1986) which take the form of checklists that look at specific components of language development. There are also structured comprehensive tests which examine language in greater detail. An example of this is the Communication and Symbolic Behavior Scales (Wetherby & Prizant, 1993) which provides a representative sample of communicative behaviour in a variety of communicative contexts. Another type of language assessment is naturalistic assessment. In these assessments, language may be analysed through the observation of certain words/forms, auditory recording of language for later transcription, or writing down everything that is said in a specific period.

Naturalistic assessments may occur in specific settings such as homes or child care centres so that the language competence can be sampled in those environments. Finally, language may be assessed as part of a developmental tool, for example, the Bayley Scales of Infant Development II (Bayley, 1993).

Although there are various language assessment tools available only a small number are designed to be used with children under the age of two years (Fenson et al., 1994). Most screening instruments for this age group sample only a small set of behaviours at each level. Similarly, the structured comprehensive tests represent only a limited set of behaviour samples. These issues can be addressed by the use of naturalistic assessments or structured procedures. However, because these tests are so comprehensive they require skill to administer, and are also labour-intensive as they require time to transcribe and analyse the data.

A number of factors may affect the efficiency and reliability of information collected from assessments involving very young children. If children are shy, unfamiliar with the researchers or surroundings, or overwhelmed with the novelty of the environment they may speak less than they normally would or may even refuse to talk (Feldman et al., 2005). The short attention spans which are common to this age group could also impact on the assessor's ability to administer the entire test, possibly resulting in an underestimation of the child's true ability.

A useful alternative that addresses most of these issues is the use of parental reporting. This can take the form of wordlists or diaries. Wordlists are usually a representative sample of words commonly spoken and/or understood by children of a particular age. These are useful as they are not overly time-consuming and do not require much skill or training to complete. Diaries provide a more

comprehensive language sample as these are kept over a period of time, or when examining specific components of children's language. Because of the amount of time that parents spend with their children and the variety of situations parent-child interactions occur in, parents can provide a wealth of information on language ability across a wide range of settings and conditions (Fenson et al., 1994). Also, because of the familiarity that exists between parent and child, the child does not need to be present to provide this information.

Parental reports have been used in a number of clinical and research settings and have proven to be valid and reliable forms of assessment of early language development. Diaries have been used in a number of studies as a means of sampling children's language. They have been used to examine the effect of a number of variables on language production, such as birth order differences at certain milestones (Pine, 1995), the linguistic differences between children's use of two languages (Kim, McGregor, & Thompson, 2000), or to provide information about language learning in specific populations such as children with developmental disorders (Price et al., 2000).

A popular word checklist using parental report is the MacArthur-Bates Communicative Developmental Inventory (CDI; Fenson et al., 1993). It has been validated against other tests such as the Expressive Vocabulary Test (EVT; Williams, 1997) and the Peabody Picture Vocabulary Test-III (PPVT-III; Dunn & Dunn, 1997) (e.g., Reese & Read, 2000). It has also been validated against laboratory assessments such as object naming tasks or language sampling, for example, language produced during free play (Marchman & Martinez-Sussmann, 2002; Thal, Jackson-Maldonado, & Acosta, 2000).

The CDI has also been adapted and translated into a number of different languages including Chinese (Tardif, Gelman, & Xu, 1999), Finnish (Lyytinen, Poikkeus, & Laakso, 1997), French (Poulin-Dubois, Graham, & Sippola, 1995), and Spanish (Fernandez & Umbel, 1991). After the initial research by the developers of new adaptations is completed, these adaptations continue to be used by other researchers, for example, in validation studies (e.g. D'Odorico, Carubbi, Salerni, & Calvo, 2001; Hamilton, Plunkett, & Schafer, 2000).

At present an adaptation of the CDI: Words and Sentences checklist known as the Australian English Adaptation of an Expressive Vocabulary Inventory (OZI), is being developed at the University of Western Sydney by researchers Schwarz, Burnham, and Bowey. It has been developed based on data collected from Sydney. A number of amendments have been made in order to reflect changes which are considered more appropriate to Australian English.

a. A total of 40 words have been removed from various categories. These include words which refer to things American such as 'alligator' or 'sled'.
b. Forty-five words were added across the various categories. These include words such as 'beanie' and 'possum'.
c. Twelve words have been replaced by Australian equivalents, for example, 'candy' has been replaced by 'lolly' and 'soda/pop' by 'cordial'.
d. Also 11 sections of the CDI have been omitted. These are 'words about time', 'pronouns', 'questions', 'questions words', prepositions and locations', 'quantifiers and articles', helping verbs', 'connecting words', 'how children use words', 'word endings/part 1', and 'complexity'.

Only five studies that utilised the CDI with an Australian population have been found. Two of them included review articles that discuss the measure of

communicative skills in Australian children; one looked at communication skills in children under age 15, while the other looked at communication measure in children with disabilities. Two of the articles found examined vocabulary production in children with Down syndrome (1 and 3 children respectively), and the final one examined infant communication in a population of 1911 children ranging in ages from 8- to 12-months old.

Another study involving the OZI has also been found. In a study involving 60 participants from the greater Sydney area the authors of the OZI (Schwarz, Burnham & Bowey, 2006) examined a number of linguistic features including phoneme sensitivity, language specific speech perception and articulation accuracy at 30-, 33- and 36-months old. The OZI was used to measure vocabulary size at the 30-month mark while the PPVT-III was used at the 30-, 33-, and 36-month periods. Results indicated that vocabulary measures from both assessment tools at the 30-month mark correlated at significant levels.

For the purposes of this current study the OZI has been further revised. A detailed description of these revisions is discussed further. The revised OZI will be used with children between the ages of 16 – 24 months. A new form will be completed and returned every six to eight weeks until each participant reaches 24 months, or over a period of eight months, whichever comes first. This will be done so that vocabulary growth can be charted. Also since a number of milestone events occur across this age range comparisons can be made with previously published studies. A diary sample will also be done at 20 months in order to compare total words recorded from the diary with that obtained from the OZI completed at the same age.

The aim of the present study is threefold. Firstly this research aims to trial the OZI in Tasmania to determine whether the vocabulary list compiled based on the Sydney data would produce similar results when used elsewhere in Australia, specifically Tasmania. There may be some substitutions common to Australian language that may be missing, or some of the Americanised alternatives remaining as part of the adapted version may not be spoken by Australian children. The present study aims to identify any such words, and to make recommendations for any substitutions, additions, or omissions.

A second aim is to obtain a language sample over a 7-day period using a parental report diary, to see whether the words included on the OZI provide a reasonable representation all the words that Australian (and/or Tasmanian) children commonly say. Because each OZI is a once-off measure, it is possible that parents may forget some of the words their children can say, as they may be relying partly on their memory for this information. There may also be words that are spoken by the children that the parents are only aware of when they are intentionally paying attention to the child's language. As previously mentioned the OZI has omitted some of the word form categories found on the original American version of the checklist, the CDI. As a result these words may not be recorded by parents on the OZI but they may be present in the diary as they are part of children's language.

Finally, a number of studies have previously examined the effects of gender and birth order on early language development. Although some conflicting results have emerged there appears to be some general trends. Research examining gender effects indicate that girls have larger and more grammatically complex vocabularies than boys of the same age. Studies looking at birth order

suggest that although first-born children have larger vocabularies than later-born children when language is recorded at similar ages, later-born children outperform their first-born counterparts in areas such as pronoun production. Consequently these results can be used in comparison with results from new studies that are looking at the same factors for similarities or differences. This research will therefore seek to examine the effects of gender and birth order on language development of the sample to see if similar results to those in previously reported studies using the CDI or an adaptation of it are produced.

Based on these aims it is predicted that:

- The following differences in the data from Sydney as represented by the original OZI and the data collected in this study will be found: (i) parents will choose the Australian version significantly more often than the American version of the same word, (ii) there will be some words recorded by parents for each category that are not included in the list of words provided and (iii) there will be similarities across OZI forms in terms of the new words recorded possibly indicating Tasmanian/Australian-wide trends.
- The following gender and birth-order differences will be found (i) first-born children will produce more words than later-born children overall, (ii) later-born children will produce more pronouns than first-born children, and (iii) girls' language will be more advanced in terms of number of words as well as complexity when compared to that of boys of the same age.

Method

Participants

The sample in this study consisted of 23 children (9 boys, 14 girls), including a pair of twins. Nine participants (5 boys, 4 girls) were first-born children, and 14 (4 boys, 10 girls) were later-born children. Of the 9 participants who were first-born children, 8 (5 boys, 3 girls) had no siblings. The age range of participants on entry to the study was 17 to 22 months with a mean age of 19 months.

All parents were invited to participate in the diary study. However, diaries were submitted for only 15 (9 girls, 6 boys) of the 23 participants due to a number of reasons. One parent had a baby at the time the participant was 20 months old, 2 participants were twins and the parent reported that it was too difficult to keep diaries for both, one participant was sick at the time the diary was to be done, and the remaining 4 parents reported that they forgot to do the diary when the participants were the appropriate age. Among the boys whose parents submitted a diary, 4 were first-born and 2 were later-born. There were also 3 first-born girls and 6 who were later-born.

In addition to the age requirement, the additional criteria for inclusion in this study were that the children had no known intellectual or physical disability which could affect language development, and that they heard English as the main language in their homes (at least 80% of the time).

Participants were mainly recruited through visits to child care centres where parents were informed of the study; posters and information sheets were displayed for other interested parents. Some child care centre operators preferred to just pass on information to the parents and /or to display posters. Other

recruitment methods included having the study included as newsletter items for three schools, displaying posters in the community, as well as via some of the participants who joined the study in the early stages. Written consent was obtained from parents prior to the commencement of data collection. Copies of the consent form and information sheet are presented in the Appendix A.

Materials

Participants were assessed using the Australian Vocabulary Checklist for Parents (OZI), and a 7-day diary. General information was also collected using a Case History Form.

The OZI (see Appendix B) is an adaptation of the MacArthur-Bates Communicative Development Inventory: Words and Sentences (CDI:WS) which is used to assess children between the ages of 16 to 30 months. The OZI is a catalogue of commonly used words of children in this age range. It is divided into 16 sections. The first 15 are word categories including sub-headings such as Sound Effects and Animal Sounds, Clothing, and Action Words. The final category is a word-form category which is further divided into Word Forms: Nouns/Verbs in Past Tense, Word Endings: Noun/Verb Errors, and Sentence Examples (three of the longest sentences that the child has said recently). Each category consists of a list of words with each word having a corresponding checkbox which is ticked if parents judge that the child can say the word. There are also blank spaces at the end of each category for parents to write words that their child says but are not included in the list.

The following changes have been made to the OZI for the purposes of this study:

a. A number of words have been added which are considered to be Australian synonyms of original American words used. These words are 'sultana, zip, cot, twinkle, twinkle and serviette'. These complement the Americanised versions of 'raisin, zipper, crib, pat-a-cake, and napkin.

b. Some word pairs have been separated and listed as separate words so that word preference could be assessed. These word pairs are 'crisps/potato chips, stomach/tummy, and garbage/rubbish. The word pair 'don't/no' is also separated. It is felt that these words have different meanings and so should have separate entries. However, neither word is considered American or Australian.

c. The body parts 'penis' and 'vagina' have been included as these are present on the CDI.

The 7-day diary is a record of all of the child's utterances kept by parents for seven consecutive days in a single one-hour session or in two 30-minute sessions, during a routine activity such as bath time, eating or playing. It is thus a reasonably representative sample of all the words a child says for one week at the age 20 months. What the child says is recorded along with a translation of what the word means if necessary (e.g., 'ghetti' for spaghetti), and the context (where applicable). Each entry requires the date, time started and completed as well as the activity or situation in which the entry is being made. A copy of the diary instruction page can be found in Appendix B.

The Case History form provides information regarding parental information such as highest educational level attained, and occupation, sibling information such as age, gender and number, and speech and language

development information such as age of first meaningful word, estimated amount of time that the child spends listening to books being read to him/her, or watching television per week. A copy of the Case History Form is presented in Appendix B.

Procedure

Participants were initially visited in their homes by one of two researchers, including the author. During the home visit the parents completed the Case History Form and the first OZI. This OZI was completed in the presence of the researcher so that any queries could be clarified. If this visit occurred when the child was 20 months or older, the parent was also shown how to record information using the 7-day diary by the author. For those children younger than 20 months when the first OZI was administered or those visited initially by the other researcher, the author visited the home when the child was 20 months old to demonstrate the use of the diary to the parents. Data were collected for an 8-month period, and additional OZI forms were mailed to each participant's parents every 6 to 8 weeks depending on the age the first OZI was administered. These were filled in by the parents and returned in reply-paid envelopes. Participants entered the study at age 17 months or older, and remained in the study until the age of 24 months, or until data collection ended, whichever came first. Since some children were already 20 months or older when they entered the study, the OZI was mailed every 6 weeks so that a minimum of 3 OZI forms could be collected by the end of the study. All other children received the OZI every 8 weeks. The completed diary was also returned using reply-paid envelopes. A total of 63 OZI forms and 15 diaries were collected over a period of

eight months. Only the raw data from the OZI and the Case History Forms were shared between the two researchers, as the diary was an additional part of the study done solely by the author.

Results

A total of 63 OZI forms were returned for the duration of the study across the four age ranges. Of the 23 participants 3 submitted only 1 OZI form, 6 submitted only 2 forms and the remaining 14 submitted 3 or more forms. Table 1 presents descriptive statistics of the total words spoken at each of the age ranges as reported by their parents.

Table 1

Means and Standard Deviations of the Total Words Spoken by Participants

Age Range	Total OZI forms (n = 63)	Mean	SD
17-18 months	10	81.60	90.64
19-20 months	19	184.89	146.48
21-22 months	17	287.67	140.98
23-24 months	17	377.06	200.32

As can be seen from Table 1 vocabulary size increased with age and statistical analysis using a repeated measure ANOVA showed this increase to be significant, $F(1,3) = 7.55$, $p = 0.00$. However, because the standard deviation of the number of words reported at each age range was very large, it was considered worthwhile to examine individual scores in order to get a clearer picture of the varied trajectories.

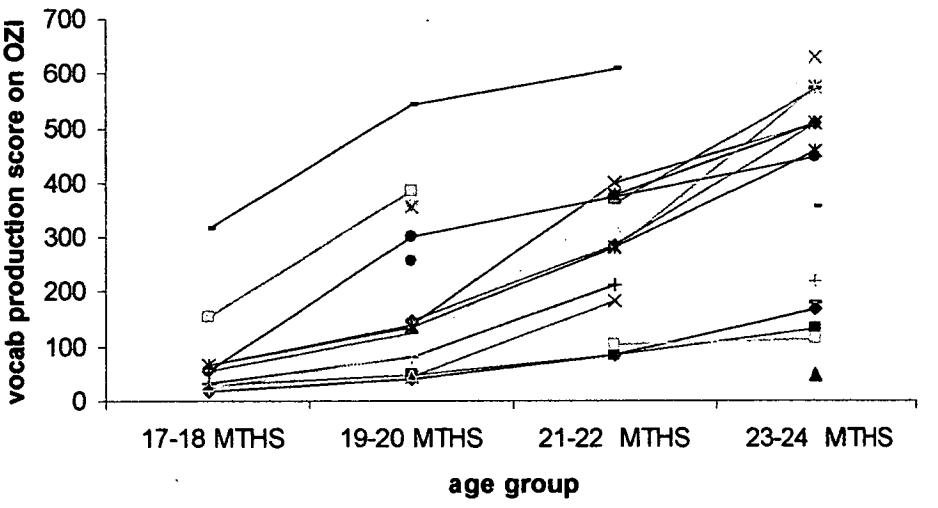

Figure 1. Vocabulary production across age ranges as measured by OZI in Tasmanian sample.

As can be seen from Figure 1 vocabulary size increased with age for all the participants who returned 2 or more forms. Analysis using Wilcoxon signed-rank test revealed that the difference in vocabulary growth across the first 2 age ranges was the same, $Z = -2.85, p = 0.01$, while the overall period of greatest vocabulary growth occurred across the 21 - 24 month period, $Z = -2.93, p = 0.00$. The majority of participants (n = 20, 87%) were producing more than 50 words by the 19 – 20 month range; the remaining 3 children all had over 40 words in their vocabulary by the same period. Only one child did not produce 50 or more words ($n = 49$) by the 23 – 24 month period. On each OZI parents were asked to indicate whether their child's speech consisted of combined words. Only 5 children were not combining words in their speech by the 19 – 20 age range measure. All children were reported to be combining words by the 23 - 24 month mark. There was no significant difference between those participants who had 50 or more words in their vocabulary by the 19-20 age range and those who did not,

X^2 (1) = 2.25, p = 0.13. However, there was a significant difference for combining words in speech at the 23 – 24 month period in favour of those children who could combine words, X^2 (3) = 16.48, p = 0.00. These results indicate that the majority of children appeared to demonstrate age-appropriate progress in most areas of vocabulary production when compared to past research.

Variations and Additions to the OZI

In order to compare the use of the American and/or Australian versions of words by Australian children, some adaptations were made to the original OZI. In instances where both the American and Australian words were listed as one option (e.g. *potato chip/crisp*), these words were separated and listed as two entries. Another change made to the OZI by the present authors was to insert a commonly used Australian word that was similar in meaning to the American version listed.

Table 2

Words Separated for the Purpose of This Study: Percentage of Participants (n=23) who could say the American, Australian or Both Versions of Each Word.

American	*N*	%	Australian	*n*	%	Both	*n*	%
Crisps	0	0	Potato chips	18	78		1	4
Stomach	2	9	Tummy	14	61		6	26
Garbage	0	0	Rubbish	11	48		5	22
Brick	0	0	Block	9	39		9	39

For example, the word 'sultana' was included on the word list to supplement the existing word 'raisin'. Finally the two words 'vagina' and 'penis' were reinserted on the word list. These words were present on the original CDI but not included on the OZI, however the researchers thought that they were common in the vocabulary of children of this age range and so should be included. Table 2 presents the percentage usage of American and Australian versions of the words that were separated for the purpose of the study. It was decided that the word pair 'don't' and 'no' did not represent the same concepts, and so these were also separated. However, this was done for clarity rather than either word being classified as Australian or American.

Not all participants spoke all of the words that were added or separated by the researchers and data are presented based on the number of participants whose parents indicated that they could say the word on at least one of the OZI forms collected for the duration of the study. Since there were not enough data points to analyse all of these data statistically, statistical analyses were performed on the 'Australian only' and 'both' categories, however, qualitative analyses are presented for all categories.

In the majority of cases parents indicated that their child spoke only the Australian version of the word being examined rather than the American version or both versions of each word separated from the pair. In some cases parents indicated that their child could say both the Australian and the American versions. However, parents reported that their child said only the American version for only one word. The percentage of children who used only 'block'(39%) was the same as that for the word pair 'block/brick', while the remaining 4 participants (17%) used only block. Parents reported that the

majority of children (n = 19, 83%) used both the words 'don't' and 'no' as opposed to just using either word solely. Although it would appear that more children could say the Australian version of the word pair only when compared to those who could say both words analyses using paired samples t-tests found the difference between the two groups not to be significant, t (3) = 2.20, p = 0.12.

Data representing the percentage of children who could say the Australian words added to the wordlist for research purposes to supplement the American words with similar meaning are presented in Table 3.

Table 3

Percentage of Participants (n = 23) Who Could Say the Australian Synonym Which Accompanied the American Word for the Purpose of the Study, or Both the American and Australian Words.

American	(n)	%	Australian	(n)	%	Both	(n)	%
Raisin	0	0	sultana	12	52		7	30
Zipper	0	0	Zip	11	48		6	26
Crib	0	0	Cot	17	74		1	4
pat a cake	0	0	twinkle	13	57		5	22
Napkin	0	0	serviette	1	4		4	17

In the majority of the cases where an Australian equivalent was included in the category to supplement the American word already listed the use of the Australian version of the word only is reported in nearly twice as many cases as the use of both words in each pair. Despite this seemingly large discrepancy between the number of children who used only the Australian synonym versus

those who used both words when paired samples t-tests were used to analyse this difference it was found not to be significant, t (4) = 2.03, p = 0.11. Only in one case was the use of both of the words in the pair greater than that of just the Australian version of the word. A total of 5 (22%) children were recorded as being able to say either 'napkin', 'serviette', or both. Of those 5 children, 4 used both words. The results of both the word pairs separated and the Australian synonyms added seem to suggest that the American version of most words highlighted for the purpose of this study may not be present in the speech of the Australian children sampled and could possibly be considered for exclusion from the OZI.

Finally, words for the male and female genitalia were added to the word list by the researchers. The word 'vagina' and the word 'penis' were reported to be spoken by 43% (n = 10) and 61% (n = 14) of the participants respectively at least once for the duration of the study. The number of participants who had the word 'vagina' (X^2 (1) = 0.39, p = 0.53) or 'penis' (X^2 (1) = 1.09, p = 0.30) as part of their vocabulary did not differ significantly from those who did not have either word in their vocabulary. Equal number of boys and girls (n = 7) were reported to say the word 'penis', while 2 boys and 8 girls reportedly had 'vagina' as part of their vocabulary. The number of participants who could say the word 'penis' (X^2 (1) = 0, p = 1) did not differ by gender, and the gender difference was not significant for those who could say the word 'vagina' (X^2 (1) = 3.60, p = 0.06).

The OZI that is being developed is based on data that has been collected only in the Sydney area. Because the OZI was used by new participants in this study, it was predicted that some words present in the vocabulary of the participants would not be included in the list of words and would therefore be

recorded by parents as additional words in that category of the OZI. The frequency of each added.

Table 4

Total Percentage Occurrence of Words That Were Added To the OZI Forms (n = 63) for the Duration of the Study

Word	% Occurrence	Word	% Occurrence
roar	38	toilet	25
neigh	37	siblings' names	22
oink	33	digger	21
hiss	33	more	19
beep	33	squeak	19
cluck	27	tweet	17
tea	27	avocado	17
toys' names	25		

word was obtained by recording each time it occurred on any of the 63 OZI forms collected. A total of 15 added words were recorded on 15% or more of the 63 OZI forms collected. Table 4 presents the total percentage of words added by parents occurring on 15% or more of the OZI forms collected. This percentage point was randomly assigned as a cut-off point by the author.

The results obtained from the total forms collected confirmed the prediction that there would be words spoken by children in the study that were not already listed. A total of 702 words were added across the 63 OZI forms collected. Some of the words that were added occurred on only a few forms. In

some instances words occurred only once (e.g., 'magpie'); in other cases although they occurred multiple times they were spoken by only one child (e.g., 'texta'), or by a small number of children only (e.g., 'pub'). There were some external factors which seem to impact on the new words added. For example, words such as 'snow' were added to more forms collected at the start of data collection which occurred during winter, than at the end, which coincided with summer. The names of fruits also followed that pattern. Those words which occurred on more than 15% of the forms may be more representative of words commonly used by the children sampled. A complete list of all the added words spoken more than 15%, including the ones provided by the researchers, is included in Appendix C.

Gender and Birth Order Effects

Based on previous studies a number of predictions were made in relation to birth-order and vocabulary size and content. It was predicted that first-born children would have larger vocabularies than later-born children. Table 5 presents the means and standard deviations for the total words produced by first-born and later-born children at each age period. From Table 5 it can be seen that overall, first-born children had a higher mean of total words than later-born children. However, a one-way ANOVA showed the difference not to be significant $F(1, 14) = 0.34, p = 0.57$. When describing language the word 'token' is used to indicate a single instance of a word, while the word 'type' refers to the set of tokens. For example, the phrase 'baa, baa, black sheep'contains 2 tokens of the word 'baa', but only one type of the word 'baa'.

Total pronoun type usage was reported from both the OZI forms and the diary entries.

Table 5

Means and Standard Deviations of Total Words Produced by First-born and Later-born Participants

First-born children *(n = 9)*				Later-born children *(n = 14)*		
Age (months)	Total no. OZIs	Mean	SD	Total no. OZIs	Mean	SD
17	3	126.00	163.70	2	87.00	94.75
18	1	55.00	0.00	4	52.25	20.30
19	5	232.00	196.15	7	172.57	142.24
20	4	196.25	166.37	3	115.50	111.36
21	2	258.50	75.50	7	259.00	135.47
22	3	415.00	162.20	5	328.67	40.93
23	2	453.30	112.76	4	292.66	201.01
24	3	498.00	112.54	8	549.25	141.18

There was no specific category on the OZI to record pronouns but some parents listed them as new words in the 'people', 'games and routines', and/or 'descriptive words' categories. The descriptive statistics for total pronoun usage is presented in Table 6.

Of the 23 participants, it was reported that 16 (7 first-born, 9 later-born) used pronouns. A chi-square test revealed that there was a significant effect for

pronoun use in favour of later-born participants, $X^2(1) = 5.76, p = 0.02$. Although both first-born and later-born participants were reported to use pronouns, it was also found that later-born children used more pronoun types as their first-born counterparts.

Table 6

Means and Standard Deviations for Pronouns Usage Reported by Parents on the OZI forms and the Diaries in the Study

	First-born children (*n* = 6)		Later-born children (*n* = 9)	
	Mean	SD	Mean	SD
Pronoun types reported in OZI	0.57	2.86	3.44	2.22
Pronoun types reported in diaries	0.79	1.11	4.16	2.17
Overall number of pronoun types reported in both diaries and OZI	3.43	1.90	5.67	4.66

The mean number of pronouns used by first-born and later-born participants were analysed using a one-way ANOVA but the difference was found not to be statistically significant, $F(1, 21) = 0.35, p = 0.56$. Thus the prediction that later-born children would produce more pronouns than first-born children is partially rejected, because even though later-born children are more likely than first-born children to produce pronouns, the difference in the overall number of pronouns produced by the two groups was not significant.

A total of 17 pronoun types were reported to be used by the participants in the study. More than half of the pronouns (n = 40, 53%) reported came from

the diaries. The word 'it' (n = 15, 21%) was the most commonly used pronoun type reported. Of the pronouns reported those referring to the child, for example, 'my', 'mine' and 'me' were among the most commonly used, ranging from 4 - 17% of the total pronouns reported. All other pronoun types were reported to be used only once with the exception of the words 'you', 'this', and 'that'. A complete list of the pronoun types is recorded in Appendix D.

The OZI forms did not allow parents to indicate whether regular past and plural tense forms were used by their children, and so grammatical complexity in terms of plural and past tense forms was reported only from diary data. Table 7 presents means and standard deviations of a number of grammatical complexities as reported in the diaries by the parents, for both girls and boys. As seen in the table, girls produced more grammatically complex forms such as plurals and past tense forms than those recorded for the boys. Due to the small number of scores, regular and irregular plural forms were analysed together as 'plural forms used' and similar analysis was done for the past tense words used. Of the participants whose parents submitted diaries, 9 participants (6 girls, 3 boys) used past tense forms and 12 participants (8 girls, 4 boys) used plural forms. Chi-square analyses revealed that there was a significant effect for gender in the use of plural forms in favour of girls, X^2 (1) = 5.4, p = 0.02, while the number of participants who used past tense forms did not differ by gender, X^2 (1) = 0.6, p = 0.44. Very few children had regular past tense forms (n = 2) of words or irregular plural forms (n = 4) in their vocabulary, as opposed to regular plural forms (n = 11) and irregular past tense forms (n = 9). Using a one-way ANOVA it was found that there was no significant effect for gender in either the total number of plural tokens, F (1, 13) = 2.33, p = 0.15 or past tense tokens used, F (1, 13) = 2.87, p = 0.11.

Table 7

Means and Standard Deviations of the Grammatical Complexities Produce as Recorded in the Diaries

	Boys *(n = 6)*		Girls *(n = 9)*		Total	
Word/Grammatical Form	Mean	SD	Mean	SD	Mean	SD
Regular past tense	0.00	0.00	0.20	0.40	0.13	0.35
Irregular past tense	0.70	0.80	2.10	2.30	1.53	1.92
Total past tense	0.70	0.80	2.30	2.70	0.83	1.53
Regular plurals	4.20	3.40	10.80	10.70	8.13	8.98
Irregular plurals	0.00	0.00	0.60	0.70	0.33	0.62
Total plurals	4.20	3.40	11.14	11.14	4.20	7.40
2 or more word sentences	21.50	12.60	95.50	94.20	63.79	79.26
Word types in diary	85.70	46.80	200.00	117.00	154.27	109.37
Word types for corresponding OZI	107.30	99.60	289.40	168.80	216.60	168.41

Table 7 shows that girls also produced more word types than boys in similar age ranges, in both the diaries and the OZI forms done at or closest to 20 months. When the total word types recorded in the diaries was examined using a one-way ANOVA a significant effect for gender was found in favour of girls, $F(1, 13) = 5.08$, $p = 0.04$. This supports the prediction that girls would produce more words than same-aged boys.

The total number of words produced overall on the OZI forms collected was examined using a one-way ANOVA. Although girls had a higher overall mean ($M = 309.33$, $SD = 139.41$) than boys ($M = 218.00$, $SD = 154.30$) this difference was not statistically significant, ($F(1, 21) = 2.07$, $p = 0.17$). In this case the prediction that girls would produce more words than same-aged boys was therefore rejected.

Comparison of Diary versus Wordlist Entries

There is controversy over the relative reliability and validity of estimations of children's vocabulary from a wordlist versus from a diary. Table 8 presents the descriptive statistics for the total words recorded in the diaries and OZI forms collected at the age when the diary was done.

A comparison was made between the total number of word types produced in the diary and the OZI completed at the age closest to the time the diary was submitted. The total 'listed' word types that appeared in the diary but not on the corresponding OZI were also examined. 'Listed' word types referred to the words that were part of the OZI, as opposed to the additional words that were recorded by parents. If a word was recorded on the OZI it was not counted in the diary so that each word type was accounted for only once. Table 8 shows the means and standard deviations of the total word types recorded in the diaries and the OZI collected at the age closest to the period the diary was completed. As can be seen from Table 8, more word types were reported on the OZI forms than in the diaries. However, it was found that 10.2% of the 'listed' word types present in the diary were not reported by the parents on the corresponding OZI.

Table 8

Means and Standard Deviations of the Total Words Recorded in the Diaries and the Corresponding OZI Forms

	Mean	SD
Type entries reported in diary	154.27	109.37
Type entries reported in corresponding OZI	216.6	168.41
Total (listed) word type entries reported in diary but not on OZI	13	13.27
% listed word type entries reported in diary but not on OZI	10.2	8.43

The relationship between the total word type entries reported in the diary and those recorded in corresponding OZI was examined, however this correlation was found to be weak ($r = 0.09$) and not significant ($p = 0.74$). Since the standard deviations of the total words recorded in both the diaries and the OZI forms were large, individual scores are also reported in Table 9. Table 9 shows the total type entries for the diary and OZI which was completed at or in close proximity to that age for each participant whose parent submitted a diary. It was expected that there would be some relation between the number of word types in the diaries and on the corresponding OZI. It was found that the total word types in the diary were strongly correlated to total word types in the corresponding OZI ($r = 0.67$), and that this relation was statistically significant ($p = 0.01$). The percentage of word type entries recorded in the diaries but not on the OZI done at 20 – 22 months was calculated. Of the 15 participants whose parents submitted diaries a discrepancy of 10% or less was found between the total number of word type

entries reported in the diaries and on the corresponding OZI forms in the majority of cases (n = 9, 60%).

Table 9

Total Type Entries for Diaries and the Corresponding OZI Forms

Type entries reported in diary	Type entries reported in corresponding OZI	Total (listed) word types reported in diary but not on OZI	% listed word types reported in diary but not on OZI
28	46	3	11
39	83	2	5
40	102	5	13
51	48	12	24
74	123	10	14
78	45	3	4
100	364	6	6
141	81	44	31
142	301	9	6
208	171	21	10
238	478	39	16
246	541	2	1
260	334	2	1
287	146	18	6
382	386	19	5

This was found regardless of vocabulary size. However, among the remaining 6 participants some of the discrepancies between the number of word type entries recorded in the diary versus the corresponding OZI were large, ranging from 11 – 31%.

Discussion

The goal of the present study was to evaluate the Australian English Adaptation of an Expressive Vocabulary Inventory (OZI) as a tool for identifying early language development among Australian children. In this study the OZI was used with a sample of Tasmanian children in order to see if it could be representative of Australian vocabulary. A 7-day diary was also used at a specific age in conjunction with the OZI. The overall results seemed to suggest that the OZI followed similar trends to other studies involving the CDI and adaptations of the CDI. However, due to the small sample size, these results need to be interpreted with caution.

When compared to other research involving wordlists, a number of similar results were obtained. One prediction was that vocabulary production would increase with age (Pan et al., 2005). This was true for all participants in this study who returned two or more OZI forms, regardless of vocabulary size. Some of the other results from this study appeared to follow similar patterns as those shown in past studies. For example, past studies have found a vocabulary spurt between the ages of 14 – 22 months (Goldfield & Reznick, 1990). However, the participants of this study showed an apparent vocabulary growth period between the 21 – 24 months. This vocabulary spurt was predicted to occur close to the 50-word acquisition mark (Pine, 1995). In the current study 20

participants were producing 50 or more words by the 19 - 20 month period, but there was no significant difference between the two groups of participants at this point. However by 23 - 24 months, 95% ($n = 22$) of the participants were producing 50 or more words. Another predicted milestone to follow the vocabulary spurt is the ability to combine words in speech (Bates, Bretherton, & Snyder, 1988; Bornstein & Haynes, 1998; Fenson et al., 1994). There was a significant effect for combining words by the 19 – 20 age range and all participants were combining words in their speech by the 23 - 24 month period.

Some participants entered the study in the 19 – 20 or 21 – 22 age range, and not all parents returned a minimum of three OZI forms as requested. In addition because the OZI forms were collected over a 6-week minimum period, it is possible that an accurate acceleration point in vocabulary was not clearly identified for each participant. The mean vocabulary scores for each age range included scores for participants returning less than three OZI forms and therefore difference in scores from one age range to another may not be reflective of individual acceleration points.

In most cases the prediction that parents would more often indicate that their child knew the Australian version than the American version of the same word when both versions of the same word were present, was confirmed by the results. However, a number of word pairs did not follow these general trends. In the case of 'brick/block' equal numbers of children were reported to use only the Australian version 'block', as well as the word pair 'brick/block'. These results may indicate that this word pair may not represent the same concept for the Australian children in this study as it does for American children. It may be suggested that for Australian children while the word 'block' may be used to

refer to toys used for building in addition to something used for building houses, 'brick' might only be used in the context of house building. The word pair 'don't/no' was separated because it was felt that these words were not synonymous in meaning and so should be represented as two separate words. The results from the study support this interpretation as more children used both words than the number of children who used either word separately. For the word pair 'napkin/serviette' it was reported that more children use the word pair than only the Australian version ('serviette'); no child used only the American version ('napkin'). This may suggest that these words represent synonymous concepts and can be represented as a word pair on the OZI rather than separate entries.

In addition it was found that the difference between the choice of the Australian version and the use of both words for either the word pairs separated or the Australian synonyms provided was not significant. Altogether the above results may suggest that the American versions of the words ('raisin', 'zipper', 'crib', 'pat-a-cake', 'crisp', 'garbage', 'brick') highlighted for this aspect of the study can be considered for omission from the OZI as they were not used by the participants in this study. It is also possible to suggest that the following Australian words may be considered for inclusion as they were the word of choice when parents were given a choice for each word pair – 'sultana', zip', 'cot', 'twinkle, twinkle', 'potato chip', 'rubbish', and 'block'. Nonetheless it is unclear at this point whether the omission of American versions of word pairs or the insertion of Australian synonyms is necessary until more research is done.

Because the OZI is a new assessment tool, and still in its developmental stages it was predicted that a number of words would be spoken by the participants that were not already listed on the OZI, and that the same words

would be added across a number of forms, indicating that they were common in the speech of the Australian children sampled. A total of 15 extra words were reported on more than 15% of the 63 forms submitted, and these words might be considered for inclusion on the existing OZI. The current researchers also reinserted the words 'penis' and 'vagina' and these were reported on over 40% of the OZI forms returned, by both girls and boys, which suggests that these words could therefore be considered for inclusion on the OZI.

Due to the small sample size it is expected that some of the additional words reported on fewer than 15% of the forms would probably occur more frequently if the sample size were bigger and more diverse. Further, to ensure that external factors such as seasons have minimal effect on the content of the wordlist, samples should be taken at different time of the year and also possibly from different geographic locations.

Another aim of the study was to examine birth order and gender effects on the vocabulary scores produced by the OZI to see if they followed similar trends to other research using CDI forms or adaptations to the CDI. Girls were expected to produce more words than same-aged boys, and the results appeared to confirm this assumption in most cases. The difference was only statistically significant when word totals from the diaries and OZI forms done closest to the period the diaries were recorded were analysed together, but not when overall scores from the OZI forms were examined. Wide variability on vocabulary scores are characteristic of the CDI (Fenson et al., 2000), and therefore any adaptation to it should show similar results. As can be seen from the standard deviations in Table 8 the numerical range of scores for girls was widely variable in every category of word/grammatical form when compared to those of boys of

the same age. For example, total type entries for the diary for girls ranged from 39 – 382, while those for the boys ranged from 28 – 142. These wide standard variations may help to explain the lack of significant differences between boys and girls in terms of number of words produced. The mean score was higher for girls than that of boys at each age range. However, some girls scored significantly higher than boys of the same age at each age range, while others scored equal to or less than the boys at the same age period. Therefore the combined factors of wide variability in the girls' scores and a small sample might better account for the fact that on average the difference between the total mean vocabulary scores on the OZI forms of boys and girls of the same age was negligible.

Another prediction made was that girls would produce more grammatically complex language than that of boys of the same age. Grammatical complexity was measured in terms of the use of past tense and plural forms, both regular and irregular. Girls produced more past and plural tense forms than boys, although neither was statistically significant. The likelihood that girls would use plural forms more than boys of the same age was statistically significant although this was not the case for past tense forms.

Overall, children produced more irregular past tense and regular plural forms than regular past tense and irregular plural forms. This may be because the rule for the spoken regular plural is simple to apply in general, whereas for irregular plurals it is more on an individual basis, for example, the words 'teeth', 'children', and 'sheep', do not have a rule in common to go from the singular to the plural form. On the other hand, words for irregular past tense may be learned in context rather than based on a rule, for example, 'I got it' meaning that

something is in the child's possession, and that this is the response he/she has learned goes with the command 'get 'x'. The words 'got', 'had', 'broke', 'stuck' therefore may be used as a label for a particular action or situation, and may have no association for the child to its present tense forms of the words 'get', 'have', 'break', 'stick'.

Because some of the information needed to compute the results for 'plural tense forms used' and 'past tense forms used' was not available on the OZI it reduced the sample used. Additionally only 65% of the participants (n = 15) took part in the diary study, further reducing the sample size, therefore conclusions drawn from these results may be negligible. Having categories on the OZI that parents could indicate the use of regular plural and past tense forms, and separating the irregular word forms on the current OZI would have provided more data points so that this prediction could be better examined. Care should therefore be taken in accepting or rejecting the hypothesis that girls would produce more grammatically complex forms than boys of the same age.

Berglund, Eriksson, and Westerlund (2005) suggested that gender has greater effects on language than birth order does when both variables are examined together. However, due to the small sample size, this hypothesis was unable to be tested. Therefore birth-order and gender effects were investigated separately. Pine (1995) found that there was no difference in the vocabulary size of first-born and later-born children by the 100-word mark and this appeared to be the case for this sample when overall vocabulary scores were examined. Results indicated that later-born children were more likely to use pronouns than first-born children but although later-born children produced more pronouns than first-born children, the difference between number of pronouns used was by each

group of children was not statistically significant. These results should not be generalised without taking into account the limited dataset for pronouns produced. Further, the number of pronouns used by each group could not be adequately analysed, as it was not possible to record pronoun tokens on the OZI. Having a larger sample or more instances to specifically record pronoun use would probably provide results that could be more accurately interpreted or more likely be generalised. Past studies suggest that later-born children learn language through overheard speech and this gives them the advantage of learning personal pronouns (Akhtar, Jipson, & Callanan, 2001, Bornstèin et al., 2004). In this study personal pronouns were among the most commonly used pronouns; the most commonly used pronoun being the word 'it'.

Additional important linguistic information can be provided by using a combination of diaries and wordlists (Kim, McGregor, & Thompson, 2000). Although the OZI provided general vocabulary information, the grammatical components of language such as pronouns produced, as well as the presence of regular plural and past tense were recorded in the diary as there was not a specific category to record them, confirming the findings that diaries can provide additional linguistic information. There was strong ($r = 0.67$) and significant correlation between the total word types recorded in the diary and the OZI done at the same age period. This implies that in the current sample the OZI appeared to be a reliable source of estimating the vocabulary size of Australian children. In the majority of cases there was a discrepancy of less than 10% between the words recorded on the diary and on the corresponding OZI. This was found regardless of vocabulary size. However, in the remaining 40% of cases the discrepancy between the total word types in the diary and corresponding OZI

was very varied ranging from 11% to 31%, regardless of vocabulary size. A number of possibilities may account for the discrepancies. Robinson and Mervis (1999) suggested that diaries are better at estimating a child's language than wordlists, because wordlists underestimate the words produced in a diary with the underestimation increasing as the vocabulary size increases. As varying results were obtained from this study it is unclear whether this suggestion was confirmed or rejected and therefore further research is needed to investigate this suggestion.

Conclusion

The adapted version of the OZI used in this study seemed to follow some similar trends to the CDI and other adaptations of it in some areas. One of these predicted trends was an increase in vocabulary size with age which was present for all participants submitting 2 or more OZI forms for the duration of the study. Another milestone trend which seemed to have been met was having both 50 or more words and 2-word combinations in their speech by 23 – 24 months. Also a number of additional words were recorded by parents for each category of the OZI that were not currently listed and some similarities were seen across the forms collected.

The OZI was adapted by having a number of additions and omissions adjusted across a range of categories. In most cases parents chose the Australian version of the word over the American counterpart or both words as representative of their child's vocabulary; however the difference between the use of both words and the choice of the Australian only word was not significant

in any case. The words for genitalia that were reinserted on the adapted OZI were used by 40% or more of the sample across all the wordlists collected.

Some similar birth order and gender effects were found in the results produced in this study. Although girls had larger vocabulary scores overall the difference was only significant to that of boys of the same age when the total word type entries from the diary and OZI done in close proximity was analysed. When the use of grammatically complex forms was tested the difference appeared to be significant in favour of girls only for plural word forms used. For birth order effects there was no significant difference in the number of words produced by first-born and later-born participants. Even though later-born children were more likely to produce pronouns the number of pronouns used was not significant between the two groups.

In retrospect a number of considerations can be suggested in order to increase the credibility of the results. Parental reports may be more accurate when the information they are required to provide is current (e.g., diary) versus retrospective information (e.g., wordlists). Also, parents may have difficulty identifying the grammatical features used by their children in everyday language. These issues may be addressed by providing specific parental training/instruction prior to the time required for completion of the first wordlist, so that they learn to intentionally listen to their child's speech. Other solutions include is to have multiple language sample sources, making sure to combine a current or ongoing language sample such as a diary, or play session with any assessment based on recall, or having multiple assessors. The vocabulary competence provided from more than one source would collectively produce more accurate results than that taken from individual sources.

In spite of having multiple recruitment processes the sample size of the study was much smaller than expected. Larger sample sizes provide more credible results. This may be achieved in a number of ways. The recruitment period could be lengthened and the geographical location for data collection could also be increase so that more parents can be contacted. Incentives can be provided for participating in the study.

Some features had insufficient data points to be adequately analysed. This can be addressed in a number of ways. Beginning data collection at an earlier age and ensuring that all participants entered the study at the same age would increase available data. Having more date points available could therefore allow researchers to more accurately investigate differences such as acceleration points, or introduction of certain linguistic features. A more effective follow-up method could also be put in place so that more parents are encouraged to return the wordlists and/or diaries on time.

Some parents reported difficulty in being able to record a diary due to the child's relatively large vocabulary size. Since linguistic milestones seem to occur within a general age range, having a diary done at an earlier age, for example, when 2-word combinations or the vocabulary spurt are either now starting or in early stages, might provide parents with a better opportunity to record a language sample at a specified time.

Despite the small sample size in this study, this current research is a valuable addition to the literature as it provides information on a new assessment tool. The OZI has been used with a sample from a different geographic location in Australia, and suggestions for omissions and additions have been provided.

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Appendix A

Information Sheet

Consent Form

Children's early vocabulary development: Information sheet

Date:
Chief Investigator: Dr Nenagh Kemp (Lecturer, School of Psychology, University of Tasmania)
Student Investigators: Lisa Ford (Honours student), Donna Payne (Masters student)

The study
You are invited to participate in a study that looks at **children's early language development**, in terms of both the words they can **understand**, and the words they can **say**.
It's often difficult to estimate just how much toddlers know, and parents are often the best judges, because they know their children so well! A team of researchers at the University of Western Sydney is developing an Australian version of a widely-used American test, which contains many words which are not often used by young Australian children (e.g., *squirrel, diaper*).
To help make sure that it's a representative sample of Australian children in general, here at the University of Tasmania we are collecting data from Tasmanian children as well, and colleagues at the Queensland University of Technology are working with Brisbane children.
The students involved in the project here in Tasmania are also looking at some of the other factors that might be associated with children's early language development, such as whether they're a girl or a boy, whether they have other siblings, or whether they enjoy looking at books.

Who can participate?
We are looking for families who have a child aged between 16 and 20 months, who is hearing 80% or more English at home, and who doesn't have any obvious intellectual or physical disability that may affect his or her language development.

What will I be asked to do?
This study involves you filling in a checklist of words that you think your child can understand or say, every two months until he or she turns two years old (so you may fill in as many as three, or as many as five checklists).
First checklist: Student investigators Lisa Ford (Honours) and Donna Payne (Masters) are both working on this project, through the School of Psychology. Lisa or Donna will visit you in your home to chat to you, and to show you the checklist. They will ask you if you think your child can understands, or both understand and say, a number of different words, sorted into categories, including Animal Sounds (e.g., *baa baa*), Vehicles (e.g., *car*) and Clothing (e.g., *pyjamas*). If there are any other words in these categories that you know your child says, but are not on the list, we'd be pleased to write those down, too. You will also fill in a form telling us a bit about your child and the other members of your family.
Later checklists: For the remaining checklists, we will send you a copy of the checklist in the mail once every two months (until your child turns 24 months old). You will have about a week to fill in each checklist, and return it to us in

the stamped envelope provided. This will give us an indication of how many, and what type of new words your child is learning, every few months.

Play sessions: Lisa is interested in how parents and children communicate with each during play. She will ask both the mother and father (mother *or* father in one-parent families) to play with their child for ten minutes each, using an interesting set of toys that she provides. Because it's hard to keep up with everything that goes on during play, Lisa will video these play sessions so she can look at them more slowly later. Apart from you, only Lisa and her supervisor, Dr Nenagh Kemp, will see these videos, and they'll be kept in secure filing cabinets.

One-week diary at 20 months: Although parents are good judges of their children's language, sometimes it's hard to remember whether your child really does say a word. Donna is interested in checking how accurate the parent checklist responses might be, so she'd like to get a more direct estimate about the words your child says. When your child turns 20 months old, we'd like you to pick a week when you can find one hour a day (for 7 days) to write down everything your child says. (You can do two half-hour sessions each day, if that's more convenient).

*As well as the **checklists**, you can participate in **either** the **play sessions** or the **diary**, or **both**.*

What will I get for participating?

We hope that you will enjoy participating in this study, and learning more about the amazing progress that children make in learning to understand and say new words, every day! We will give you copies of all the checklists you've filled in, if you'd like a reminder of just how quickly your child has learned so many new words in just a few months.

Also, your child will receive some stickers, pencils, or other small present, for his or her hard work in producing the data for our study.

Will my responses be kept confidential? Could I withdraw, or make a complaint?

Information collected from families participating in this study will remain fully confidential and data will be kept securely in the School of Psychology, in locked filing cabinets and on password-protected computers. Code numbers will be used to identify participants, and names will be kept separately from coded response sheets. This will ensure that participants and their responses are not identifiable. The raw data will be retained for a minimum of five years after publication, after which they will be shredded/deleted. When completed, group results from this study will be made available on the School of Psychology website (www.scieng.utas.edu.au/psychol) or by contacting the Chief Investigator, Nenagh Kemp, on 6226 7534.

Participation in this research is entirely voluntary, and you will need to read and sign the Consent Form before proceeding. You may withdraw from the study, or withdraw your data, at any time, without effect or explanation.

If you have any questions, or would like any additional information regarding this research please contact Nenagh Kemp. There are no foreseeable risks or discomforts for the participants in this study, which has been approved by the Human Research Ethics Committee (Tasmania) Network. If you have any

concerns about the ethics of this study, you can contact the Network's Executive Officer, Ms Amanda McAully, phone 6226 2763.
You will receive a copy of this Information sheet, and of the statement of Informed Consent. One copy of the Consent form should be signed for the investigator, and one will be given to you to keep for your own records.

How can I participate?
If you'd like to participate, please contact Chief Investigator Nenagh Kemp, at the University's School of Psychology, by phone (6226 7534) or email (nenagh.kemp@utas.edu.au) or student investigators Lisa Ford (lmford@utas.edu.au) / Donna Payne (djfpayne@utas.edu.au).
Thank you for taking the time to read this information sheet. We hope you will be willing to participate in this study.

Dr Nenagh Kemp	Lisa Ford	Donna Payne
Chief Investigator	Student investigator	Student investigator

Children's early vocabulary development: Statement of Informed Consent

Chief Investigator: Dr Nenagh Kemp, Lecturer, School of Psychology, University of Tasmania
Student Investigators: Donna Payne and Lisa Ford

I have read and understood the Information Sheet for this study. The nature and possible effects of the study have been explained to me, and any questions have been answered to my satisfaction.

I understand that the study involves estimating the words that my child can understand and/or say by filling in a vocabulary checklist every 2 months until he/she turns 24 months old. The first session will take place in my own home, but I will receive later vocabulary checklists by mail, complete them at home, and return them in a reply-paid envelope. I will also be asked to complete a Case History form, which asks questions about my child's development, number of siblings, and parent education. Both the mother and father (mother *or* father in one-parent families) will be asked to play with their child for 10 minutes each with a set of toys. This session will be videotaped to allow the student investigator to later count the number of verbal and non-verbal (e.g., pointing) communications that the parent and child make during each session. Only the student and her supervisor will see this video.
When my child turns 20 months old, I understand that I will be asked to record my child's utterances for one hour a day, for seven days. There are no foreseeable risks to participating in this study.

I understand that all data collected (including video) will be securely stored at the University of Tasmania for at least five years after publication, and will then be destroyed. I agree that the data gathered from me and my child in this study may be published, provided that we cannot be identified as participants. I understand that our identity will be kept confidential and that any information I supply to the researcher will be used only for the purposes of the research.

I understand that all data collected will be securely stored at the University of Tasmania for at least five years after publication, and will then be destroyed. I agree that the data gathered from me and my child in this study may be published, provided that we cannot be identified as participants. I understand that our identity will be kept confidential and that any information I supply to the researcher will be used only for the purposes of the research.

I agree to participate in this investigation, and understand that I may withdraw at any time without effect, and if I so wish, may request that any data I have supplied to date be withdrawn from the research.
Signatures from one/both parents, as applicable:

Mother's name: _____ Father's name: _____

Mother's signature: _____ Father's signature: _____

Date: _____ Date: _____

Statement by Investigator: I have explained this project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

Investigator's name: _____ Signature: _____ Date: _____

Appendix B

Case History Form

OZI

Diary Instruction Page

Child's Code _____

Children's early language development

Case History Form

Please complete this form as accurately as you can. This information is entirely ***CONFIDENTIAL****. This page with your child's name will be kept separately from the other pages, which will be identified only by a code. All information will be kept securely in locked filing cabinets at the University of Tasmania.*

Child's name _____

Relationship to child of person filling out this form (e.g., mother)

_____

Date _____

Child's Code _____

A. GENERAL INFORMATION

1. Home address:

_____

_____ Postcode: _____ Home phone no.

_____

2. Mother's name: _____ 3. Occupation:

_____

4. Highest grade completed: ☐ Primary ☐ Secondary (gr. __) ☐ College

☐ (gr.__) University (no.yrs.____)

Other education_____

5. Father's name _____ 6. Occupation:

_____

7. Highest grade completed: ☐ Primary ☐ Secondary (gr. ___) ☐

College (gr.___)

☐ University (no.yrs.____) Other

education_____

8. Other children in the family (write on back if more than two others):

Sex (M/F) Date of birth (DD/MM/YY) Sex (M/F) Date of birth

(DD/MM/YY)

1. _____ _____ 2. _____

_____

B. SPEECH AND LANGUAGE DEVELOPMENT; ACTIVITIES

1. Did your child coo and babble (e.g, "dadada") during the first 6 months? Yes☐ ☐

No

2. At what age (if it's happened yet) did your child say:

His/her first meaningful word? _____ Two or three words together?

_____

3. Does your child enjoy looking at books and listening to stories? Ye☐ No☐

Estimate how many books you read/share with your child each week:

_____

4. Does your child attend day care, childcare, etc? How often?

_____

5. About how much TV does your child watch per week?

_____

6. About how many hours per week do you spend interacting one-on-one with your

child? Mother _____

Father_____

OZI Cover Sheet

Child's Name: _____

ID Number: _____

Child's ID: _____ Gender: f / m

Date of Birth: _____ Testing Date: _____ Age in Months: _____

Australian English Developmental Vocabulary Inventory - OZI

(adapted from Fenson et al., 1993, for research purposes)

*Although children understand many more words than they say, we are particularly interested in the **words your child says**.*
*Please go through the list and mark the words you have heard your child use by **clearly ticking the circle** that belongs to the word.*

*If your child uses a **different or incomplete pronunciation** of a word (for example, 'raffe' instead of 'giraffe' or 'sketti' instead of 'spaghetti'), mark the words anyhow as we are interested in the vocabulary of your child, not in his/her articulation.*
If you like, you can write your child's version of the word next to the original.
*Please **add words** that your child says that are not listed, in the spaces provided at the end of each section.*

*Remember that this is a catalogue of all words used by many different children at different ages. As the **individual development can vary** greatly, you don't need to be worried if your child only knows a few of the words at this stage.*

Wordlist:

1. Sound Effects and Animal Sounds

baa baa	O	meow	O	uh oh	O
choo choo	O	moo	O	vroom/broom	O
cockadoodledoo	O	ouch	O	woof woof	O
grr	O	quack quack	O	yum yum	O

Any other sound effects and animal sounds?

2. Animals (real or toy)

animal	O	donkey	O	owl	O
ant	O	duck	O	penguin	O
bear	O	elephant	O	pig	O

bee	O	fish	O	pony	O
bird	O	frog	O	possum	O
bug	O	giraffe	O	puppy	O
bunny	O	goose	O	sheep	O
rabbit	O	horse	O	snake	O
butterfly	O	kangaroo/roo	O	spider	O
(pussy)cat	O	koala	O	tiger	O
cockroach	O	lamb	O	turkey	O
cow	O	lion	O	turtle	O
crocodile	O	monkey	O	wombat	O
deer	O	mouse	O	zebra	O
dog	O				

Any other animal words?

3. Vehicles (real or toy)

(air)plane	O	fire truck	O	tractor	O
bicycle/bike	O	fire engine	O	train	O
boat	O	helicopter	O	three wheeler	O
bus	O	motorbike	O	tricycle/trike	O
car	O	pram	O	truck	O
		stroller	O		

Any other vehicle words?

4. Toys

ball	O	crayon	O	present/pressie	O
balloon	O	doll	O	puzzle	O
bat	O	game	O	story	O
block	O	glue	O	teddy bear	O
brick	O	pen	O	toy	O
book	O	play dough	O		
bubbles	O	pencil	O		

Any other toy words?

5. Food and Drink

apple	O	fish	O	pineapple	O
banana	O	food	O	pizza	O
beans	O	grapes	O	popcorn	O
biscuit/bikkie	O	hamburger	O	potato	O

bread	O	ice	O	(potato) chip	O

butter	O	icecream	O	crisps	O
cake	O	jam	O	pudding	O
carrot	O	jelly	O	pumpkin	O
cereal	O	juice	O	raisin	O
cheese	O	lolly	O	sultana	O
chicken	O	mango	O	sandwich	O
chocolate	O	meat	O	soup	O
chewing gum/chewie	O	milk	O	spaghetti	O
coffee	O	muffin	O	strawberry	O
coke	O	noodles	O	toast	O
cordial	O	nuts	O	(tomato) sauce	O
corn	O	orange	O	tuna	O
custard	O	pancake	O	vanilla	O
doughnut	O	pasta	O	vegemite	O
drink	O	peanut butter	O	vitamins	O
egg	O	peas	O	water	O
salt	O		O	yoghurt	O

Any other food and drink words?

6. Clothing

beanie	O	jacket	O	shoe(s)	O
belt	O	jeans	O	shorts	O
bib	O	jumper	O	slipper(s)	O
boot(s)	O	nappy	O	sock(s)	O
button	O	necklace	O	sunglasses/sunnies	O
coat	O	pyjamas/jamies	O	thongs	O
dress	O	pants	O	underpants/undies	O
hat	O	shirt	O	zipper	O
				zip	O

Any other clothing words?

7. Body Parts

ankle	O	face	O	mouth	O
arm	O	finger(s)	O	neck	O
belly button/navel	O	foot/feet	O	nose	O
breasts*	O	hair	O	penis*	O
bottom*	O	hand	O	shoulder	O
cheek	O	head	O	stomach	O

chin	O	knee	O	tummy	O
ear	O	leg	O	tooth/teeth	O
eye	O	lips	O	toe(s)	O
vagina*	O	nail(s)	O	tongue	O

* or word used in your family

Any other body words?

8. Small Household Items

basket	O	garbage	O	plate	O
bin	O	rubbish	O	purse	O
blanket	O	glass	O	wallet	O
bottle	O	hammer	O	radio	O
box	O	jar	O	serviette	O
bowl	O	keys	O	napkin	O
broom	O	knife	O	scissors	O
brush	O	lamp	O	soap	O
bucket	O	light	O	spoon	O
camera	O	medicine	O	tape	O
can	O	money	O	telephone/phone	O
clock	O	mop	O	tissue	O
comb	O	mug	O	toothbrush	O
cot	O	newspaper/paper	O	towel	O
cup	O	photo	O	tray	O
dish	O	picture	O	vacuum cleaner	O
fork	O	pillow	O	watch	O
		plant	O		

Any other household item words?

9. Furniture and Rooms

bathroom	O	drawer	O	room	O
bath (tub)	O	fridge	O	shower	O
bed	O	garage	O	sink	O
bedroom	O	high chair	O	stairs	O
bench	O	kitchen	O	table	O
chair	O	living room	O	TV	O
computer	O	lounge room	O	veranda	O
couch/lounge/sofa	O	oven	O	porch	O
crib	O	stove	O	wardrobe	O
cot	O	play pen	O	potty	O
washing machine	O	rocking chair	O	window	O

door	O				

Any other furniture and rooms words?

10. Outside Things

backyard	O	pool	O	stick	O
cloud	O	rain	O	stone	O
flag	O	rock	O	street	O
flower	O	roof	O	sun	O
footpath	O	sandpit	O	swing	O
garden	O	shed	O	tree	O
grass	O	shovel	O	wall	O
hose	O	sky	O	water	O
ladder	O	slide	O	waves	O
lawn mower	O	sprinkler	O	wind	O
moon	O	star	O		

Any other outside things words?

11. Places to Go

barbecue	O	house	O	school	O
beach	O	movies	O	kinder/kindie	O
bush	O	outside	O	preschool	O
church/mosque*	O	park	O	shop	O
city	O	party	O	show	O
country	O	petrol station	O	yard	O
farm	O	picnic	O	work	O
home	O	playground	O	zoo	O

*or equivalent

Any other places to go words?

12. People

aunt	O	police(man)*	O	nurse	O
baby	O	aunt	O	doctor	O
babysitter	O	fireman	O	person	O
people	O	friend	O	pet's name	O
brother	O	friend's name/s	O	boy	O
child/kid	O	girl	O	postman	O
kid	O	grandma/nanna*	O	sister	O
child's own name	O	grandpa/pop*	O	teacher	O

clown	O	lady	O	uncle	O
cowboy	O	man	O		
daddy*	O	mummy*	O		

*or word used in your family

Any other people words?

13. Games and Routines

bath	O	don't	O	peekaboo	O
breakfast	O	hi	O	please	O
call (on phone)	O	hide and seek/hidie	O	shh/shush/hush	O
ring (on phone)	O	lunch	O	shopping	O
dinner	O	nap	O	snack	O
give me five!	O	night night	O	thank you	O
goodbye/bye bye	O	no	O	wait	O
go potty	O	patty cake/pat-a-cake	O	want to	O
hello	O	twinkle twinkle	O	yes	O

Any other games and routines words?

14. Action Words

bite	O	drive	O	hug	O	read	O	sweep	O
blow	O	drink	O	hurry	O	ride	O	swim	O
break	O	drop	O	jump	O	rip	O	swing	O
bring	O	dry	O	kick	O	run	O	take	O
build	O	dump	O	kiss	O	say	O	talk	O
bump	O	eat	O	knock	O	scratch	O	taste	O
buy	O	fall	O	know	O	see	O	tear	O
call	O	feed	O	lick	O	shake	O	tell	O
carry	O	find	O	like	O	share	O	think	O
catch	O	finish	O	listen	O	show	O	throw	O
chase	O	fit	O	look	O	shut	O	tickle	O
clap	O	fix	O	love	O	sing	O	touch	O
clean	O	get	O	make	O	sit	O	wake	O
climb	O	give	O	open	O	sleep	O	walk	O
close	O	go	O	paint	O	slide	O	wash	O
cook	O	hate	O	pick	O	smell	O	watch	O
cover	O	have	O	play	O	smile	O	wipe	O
cry	O	hear	O	pour	O	spill	O	wish	O
cuddle	O	help	O	pretend	O	splash	O	work	O
cut	O	hide	O	pull	O	stand	O	write	O

dance	O	hit	O	push	O	stay	O	
draw	O	hold	O	put	O	stop	O	

Any other action words?

15. Descriptive Words

all gone	O	full	O	orange	O
asleep	O	gentle	O	poor	O
awake	O	good	O	pretty	O
bad	O	green	O	quiet	O
better	O	happy	O	red	O
big	O	hard	O	sad	O
black	O	heavy	O	scared	O
blue	O	high	O	sick	O
broken	O	hot	O	sleepy	O
brown	O	hungry	O	slow	O
careful	O	hurt	O	soft	O
clean	O	last	O	sticky	O
cold	O	little	O	stuck	O
cute	O	long	O	thirsty	O
dark	O	loud	O	tiny	O
dirty	O	mad	O	tired	O
dry	O	nasty	O	wet	O
easy	O	naughty	O	white	O
empty	O	new	O	windy	O
fast	O	nice	O	yellow	O
fine	O	noisy	O	yucky	O
first	O	old	O	yummy	O

Any other descriptive words?

Word Forms: Nouns / Verbs in Past Tense

Please mark any of the following words your child uses.

children	O	men	O	teeth	O
feet	O	mice	O		

ate	O	fell	O	made	O
blew	O	flew	O	ran	O
bought	O	got	O	sat	O
broke	O	had	O	saw	O

came	O	heard	O	took	O
drank	O	held	O	went	O
drove	O	lost	O		

Word Endings: Noun / Verb Errors

Young children often place the wrong endings on words. For example, a child might say "Auntie goed home". Errors like this are often a sign of progress in language. Please mark all errors you recently noticed in your child's speech.

blockses	O	mans	O	sockses	O
childrens	O	mens	O	teeths	O
childs	O	mices	O	toeses	O
feets	O	mouses	O	tooths	O
foots	O	shoeses	O		

ated	O	comed	O	goed	O	ranned	O
blewed	O	doed	O	gotted	O	runned	O
blowed	O	dranked	O	haved	O	seed	O
bringed	O	drinked	O	heared	O	satted	O
buyed	O	eated	O	holded	O	sitted	O
breaked	O	falled	O	losed	O	taked	O
broked	O	flied	O	losted	O	wented	O
camed	O	getted	O	maked	O		O

Has your child begun to combine words yet, such as "nother cracker" or "doggy bite"?

not yet	O	sometimes	O	often	O

If you answered 'not yet', please go to section "Additional Questions".
If you answered 'sometimes' or 'often', please continue with "Sentence Examples".

Sentence Examples

Please list three of the longest sentences you have heard your child say recently.

1. _____

2. _____

3. _____

Additional Questions:

1. Does anyone speak to your child in a language other than English?
   Yes/No

   If yes, which language(s)?

   On average, how many hours per week would your child hear the language(s)?

Language: _____ Hours per week: _____

Language: _____ Hours per week: _____

2. Has your child ever had any hearing problems? Yes/No

   If yes, please specify: _____

3. Was your child born full term? Yes/No

   If no, how many weeks premature? _____

Thank you very much for your time and effort.

This space is provided for comments from your side:

_____

_____

_____

ONE-WEEK DIARY OF YOUR CHILD'S LANGUAGE AT 20 MONTHS

Purpose:
Parents do a good job of judging the words that their children know when they tick the boxes on our checklist. But sometimes it's hard to remember whether your child really does say a word, or to remember any extra words he or she knows. This exercise will give researchers (and parents) a clearer idea of how accurate the checklist method is, compared to direct recording of words.

What to do:

- When your child turns **20 months** old, we'd like you to pick **one week** when you can find **one hour a day** to write down everything your child says.
- You can do **two half-hour sessions** each day, if that's more convenient.
- Do this for **seven consecutive days** (if you miss one or two, add them to the end to make seven).
- It's often best to choose a **routine activity**, such as bath-time, dinner-time, getting ready for bed-time, when both you and your child feel comfortable.

What to write down:

- Day, date, time started and finished.
- The activity your child was involved in.
- All the things your child said for that one hour.
- If your child talks too fast to write everything down, do the best you can!
- If your child uses words that only your family understands, write a translation after the word (e.g., "I want my lala [blanket]").

When you've finished:

- Return the diary by post in the reply-paid envelope.
- If you like, we can make a copy for you to keep as a record of your child's 20-month talking!

Appendix C

New Words Added to OZI by Parents

Table 10

New Words Suggested for Inclusion That Were Added to More Than 15% of the OZI Forms Returned

category	word	Percentage occurrence on total OZI forms (n = 63)
1. sound effects	oink	33
	hiss	33
	roar	38
	squeak	19
	beep	33
	cluck	27
	snap	21
	tweet	17
	neigh	37
3. vehicles (real or toy)	digger	21
4. toys	toys' names	25
5. food & drink	avocado	17
	tea	27
9. furniture & rooms	toilet	25
12. people	siblings' names	22
13. games & routines	more	19
	Australian alternatives added by researchers	
5. food & drink	sultana	70
6. clothing	zip	51
9. furniture & rooms	cot	48
13. games & routines	twinkle twinkle	63
	Australian alternatives separated by researchers	
4. toys	block	59
5. food & drink	potato chips	52
7. body parts	tummy	59
8. small household items	rubbish	48
13. games & routines	no	87
	Additional words provided by researchers	
7. body parts	vagina	21
	penis	32

Appendix D

Total Pronouns Used

Table 11

Total Pronoun Type Occurrence on Both OZI Forms and Diaries.

Pronoun	frequency	%	OZI	OZI	diary	diary
mine	12	17%	9	26%	3	8%
my	8	11%	3	9%	5	13%
me	7	10%	3	9%	4	10%
I	3	4%	1	3%	2	5%
you	7	10%	4	11%	3	8%
yours	1	1%	0	0%	1	3%
her	1	1%	0	0%	1	3%
his	1	1%	0	0%	1	3%
him	1	1%	0	0%	1	3%
itself	1	1%	1	3%	0	0%
it	15	21%	7	20%	8	20%
that	9	13%	4	11%	5	13%
this	5	7%	1	3%	4	10%
these	1	1%	0	0%	1	3%
somebody	1	1%	1	3%	0	0%
nobody	1	1%	1	3%	0	0%
everybody	1	1%	0	0%	1	3%
17	75		35		40	
AVERAGE	4.41		2.06		2.35	
SD	17.20		8.18		9.13	